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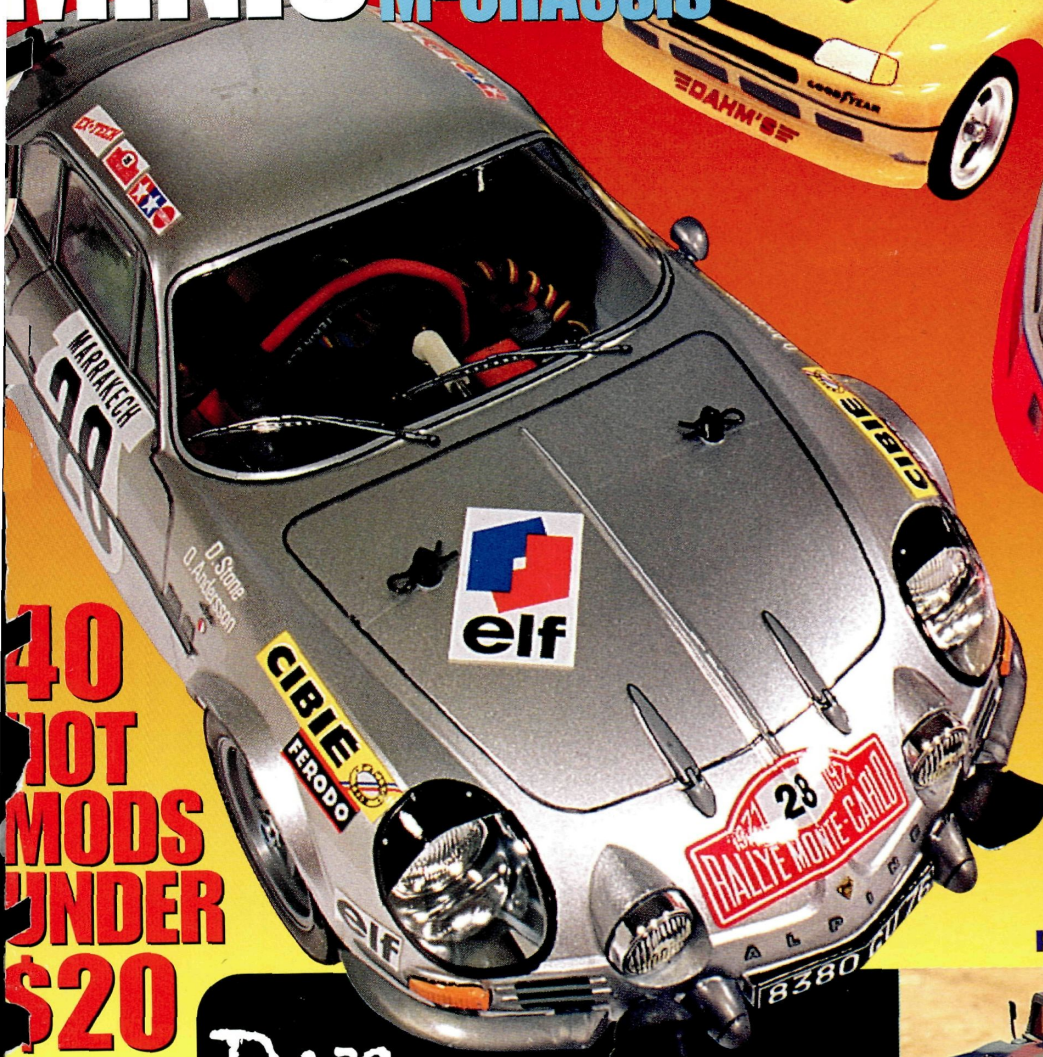
20 new products from Japan (pg. 19)

CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

September 1996

**MIGHTY TRICKING-OUT
MINIS TAMIYA'S
M-CHASSIS**



**40 HOT
MODS
UNDER
\$20**

**EASY TUNING
TIPS FOR
BEGINNERS**

**THE SECRETS OF
GOOD STARTS**

Touring Car Tests

Kyosho TF-2 and
Yokomo YR-4 M

plus: HPI RS4 hop-ups

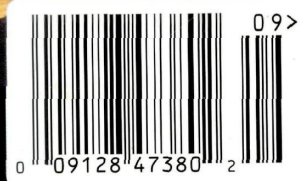
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ON THE COVER: the mighty minis (photos by Walter Sidas); Tenth Technology's Predator and Tamiya's M1025 Hummer (photos by John Howell).

THIS PAGE: fun on the drivers' stand at the Hobby Shack/Race Connection Exhibition race (photo by Mike Ogle); Project M Comical Racer (photo by Walter Sidas).

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What do I mean by "Everybody won"? Do I mean everybody went home with a trophy? Of course not! Do I mean everybody had a *fair shot* at going home with a trophy? Do I mean everybody was excited instead of frustrated? Do I mean everybody had fun!?

Yes, I mean all of that—and more.

If ever I attended an event that exemplified what parking lot racing should be, it was Hobby Shack's race at the Petersen Museum (covered in this issue by Mike Ogle). I saw for myself. There were "thrasher kids" and average Joes, Boy Scouts and moms with babies in strollers. And you know what? They were all smiling. Sure, some had an off day; some even DNF'ed because of equipment failure, but there was a mood of acceptance that that's all in a day's racing. And I never heard any arguments or foul-attitude grumbling.

I've been asked more than once: Chris, why do you guys give Hobby Shack's races so much ink in "Grassroots Racing"? My answer? Because it's my observation that all Hobby Shack's races are run according to this "everybody-has-fun,



Everybody Won!

everybody-wins" philosophy—a philosophy that can only help the longevity of our hobby and one that *Car Action* supports. I've already received calls from hobby dealers here on the East Coast asking whether we would give them coverage on similar events, and we're taking a look at all of them. Obviously, we can't cover them all, but we will do our part to encourage the growth.

While on the topic of helping to advance parking lot, we have even more in this issue for you lovers of "the lot." We review two of the latest on-road warriors—first, Kyosho's TF-2 (reviewed by Doug Mertes); and second, we have a review on the Yokomo YR-4M from our newest West Coast contributor, B.J. Christensen. (Welcome aboard BJ!) We also have a "2nd Look" from larva-man! Yeah! Yes, this month, Mr. John "Even if it costs way too much I'll add it to my sedan racer, then maybe I'll beat Chris" Howell hops up the belt-drive HPI RS4. Once again, sluggie boy works his metamorphic magic by sticking his talented pupa eyespot to the Nikon viewer to bring us those amazing shots. Thanks, Doog; we won't salt you this month. And finally, for all you Tamiya Mini Cooper fans, associate editor George M. Gonzalez has put together an all-encompassing "mini extravaganza" that you just can't afford to miss! Check it out!

Seriously, I hope you find this issue to your liking. Remember to let us know what you think, what you need and how you're doing.

Chris Chianelli, Senior Editor

We want to hear from you! Write, fax, or e-mail us on the Internet: R/C Car Action, 251 Danbury Rd., Wilton, CT 06897-3035; fax: (203) 762-9803; e-mail:

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**Flunking R/C 101**

I am 14 years old, and I would like to say that your magazine rules! I saw an issue that my cousin had stashed away and immediately became interested in the hobby. Since then, I have purchased an MRC MT-10S and have hopped it up considerably.

In the September '95 issue, George Gonzalez mentioned in his "Project MRC MT-10S" article that he bought Lunsford titanium turnbuckles for it. What are the sizes and the stock numbers of the tie



rods he used? Will any other tie rods fit?

Also, I have a Novak Tempest and a Trinity Midnight. What would be the best gearing for a track with a few short straight-aways and many turns? When should I expect companies to release parts for my truck?

JASON LANCASTER
Silver Springs, MD

Hey, Jason, they let me out of my cage long enough to answer your letter. I'm glad that you liked my project report on the MRC MT-10S. I had a great time writing it. I'd better watch out, though; I don't want the people on top of the *Car Action* totem pole to think that I'm having too much fun.

Anyway, Lunsford doesn't sell a titanium tie-rod kit for the MT-10S.

The company does, however, sell their Punisher tie rods individually (I did mention this in the article). The sizes range from 1 inch to 2¾ inches, and they come in ⅛-inch increments. Most well-stocked hobby shops sell them individually.

If you have trouble finding a shop that sells them, give Lunsford a call at (503) 928-0857, and they'll hook you up. I also mentioned the tie-rod sizes in my article, so if you were doing research for a report in one of your classes at school, you would have failed, dude! Here are the sizes you need: upper front—2.25 inches; lower front—2.50 inches; rear—2.75 inches.

The 20-tooth, 48-pitch pinion gear that came with your kit should be fine. If you need more top speed, plop a 21- or 22-tooth pinion gear onto your motor. If you want more off-the-line punch, install a 19-tooth pinion gear. I wouldn't recommend a pinion gear with fewer than 19 teeth for the motor you're using because your truck would be undergeared. Good luck, and you'd better pay more attention to my articles next time, or I'll call your teacher. *George*

Small Truck, Big Motor

I like those little ⅛-scale cars and want to know whether any company makes a ⅛-scale stadium truck or buggy? Has any company manufactured one in the past? Also, how much run time would I get with an Aveox brushless

motor and a 6-cell Team Orion P2000 activated battery pack?

STEVE DWORZECKI
St. Clair Shores, MI

Well, Steve, I've never seen a ⅛-scale stadium truck or buggy, and to the best of my knowledge, none has ever been made—interesting thought, though. I'd like to see an even smaller ⅛-scale full-suspension truck (like the BRP Oval Outlaws) that could be raced on a tiny, backyard, off-road track. Who knows? Maybe some company will make one soon. Hope you see this, Bud!

Some of the previous Aveox brushless motor systems were designed to run on 7 cells or more, but they're working on a new system that was designed specifically for a 6-cell R/C car application. I hear that it's very hot! Run time will depend on the type of car and gearing that you plan to use, but you can expect it to be nearly twice as long as those of most standard brush-type motors.

I've been using Aveox motors for several years and have always been impressed by their performance and run times. For more information on this system, call the folks at Aveox; (818) 597-8915. Thanks for the letter.

George

Stadium Blaster Gone Buggy Master

You probably receive hundreds of letters that start off with something like "I love your magazine," or "You guys are the greatest." So I won't say it. Besides, you know I love your magazine, or I wouldn't have written this letter. OK, I'll get to the point. I have a Kyosho Inferno ST ⅛-scale stadium truck, but

now I regret that I bought it because I would prefer a buggy. Is there a conversion kit available that I can use to turn it into a buggy? If not, which parts do I need?

Also, the other day my uncle drove my Associated RC10T into a lake by accident. What kind of problems do you think I will encounter?

JASON KIM
Bellflower, CA

Hey, Jason, just for the record, you did praise us in your introduction even though you said that you weren't going to. The Kyosho Inferno ST can easily be converted into a buggy, and all the parts are available through Great Planes Model Distributors, (217) 398-3630, or your local hobby shop. Here are the parts and part numbers you will need: front shocks (pair)—KYOC5733; rear shocks (pair)—KYOC5734; front shock tower—KYOC5815; body mount—KYOC5815; front bumper—KYOC3645; wheels—KYOC6400 (order two); tires—KYOC6266 (order two); tire foams—KYOC4251 (order two); Inferno body—KYOC2445; wing—KYOC6361; wing mount—KYOC6368; 13-tooth clutch bell—KYOC2955.

Now on to your "amphibious" RC10T. I once drove an R/C car into a pool, and it sank to the bottom like an anchor. Needless to say, the ESC and motor got fried; I managed to salvage the battery pack, though. I'm almost certain that your ESC will need servicing, and there is a good chance that it can't be fixed. If your truck had a modified motor installed when it went for a swim, you could rebuild it—that is, if it hasn't started to rust.

(continued on page 10)

Errata: an error appeared in the July issue's "Scoping Out" column. The resistance of the Tekin G-12c calculated along the full length of the battery and motor wires at 12 amps with a voltage drop of 0.06 volts was expressed as 0.004 ohm when, in fact, the resistance should have been expressed as 0.005 ohm [resistance = voltage (0.06 volt) ÷ by current (12 amps); (0.06 ÷ 12 = 0.005 ohm)].

A circuit that has 0.004 ohm of resistance at 30 amps has a voltage drop of 0.12 volt. A circuit that has 0.005 of resistance at 30 amps has a voltage drop of 0.15 volt. The difference is 0.03 volt, or 30 millivolts. Most racers would kill to have a battery pack that had more voltage than their competitors'.



LETTERS

(continued from page 8)

If you were using a stick-pack battery, remove the shrink wrap and dry it thoroughly. Towel-dry the cells, then use a hair dryer on the areas you can't reach with the towel. Also, completely disassemble the truck, tranny and all. Of course, you'll need to dry everything and re-lube all the metal parts, especially the bearings. If you don't, your truck will be ruined. Sorry to hear about the mishap.

George

Australian Rally Fan

To Frank Masi, John Howell and especially Chris Chianelli (who thinks he is first in rallying):

I just thought that I would write to inform you that R/C rallying has been alive and well and living in Australia for the past two years. I have been running my Tamiya rally cars' wheels down and dirty here in Norseman, Western Australia, since

February 1994. (I have a Celica 4WD and an Escort 4WD.) My whole family greatly enjoys the hobby/sport of radio control.

Our nearest town (and what would resemble a hobby shop) is 200 kilometers away, either to the north or the south. Just a bit of information: my Tamiya Celica cost \$700 (Australian) as a complete kit with radio and battery. The Escort was considerably cheaper at \$600 complete. A ROAR stock motor costs nearly \$100, and a Tekin Rebel ESC is \$275. I am a high school teacher, and I have to save all year to buy my car a hotter motor and ESC. (It doesn't help that I'm married with four kids, but as I said, we all enjoy R/C.)

With this in mind, I set out to develop a set of "class rules" similar to those that the real rally cars use in Australia. I strongly feel that R/C cars should be fun! (Am I misguided or what?) Many

kids can't afford "real" R/C cars like Tamiya's, so the Jet Hopper-type cars are very popular. Therefore, the classification system I devised gives everyone a chance to race against someone with a similar car. I got the motor sizes out of an old Tamiya catalogue, and they seem to coincide with most Japanese toy motors.

We rally on the salt-lake bed here (a large clay pan, basically), but other surfaces are available. Some unused lots, covered in fine crushed basaltic rock, are great fun because the cars slide into the corners like real rally cars. I have recently discovered an area near town that is mainly clay mixed with gypsum and covered with river sand—a sort of coarse beach sand. This area is hilly, and the soil is soft enough to allow the course to be re-sculpted at any time.

The stages are run against the clock. The fastest time out of three

tries is recorded; the fastest time for the class wins. Because the cars are not constantly running, it seems that the run time is longer than what it would normally be. The most difficult problem I have had is keeping grit out of the mechanical speed control. A miniature Ziploc™ bag and tape do work quite well.

I have found the Tamiya cars extremely durable, and (knock on wood) I haven't broken anything yet. I don't think that you would have to specially scratch-build a rally car; I have used mine out of the box with excellent results. I would like someday to make a rally car from a Tamiya Honda Civic, but right now, funds are lacking. I think it would be a ripper.

I hope that you take the time to read this, and I hope that you will enjoy rallying half as much as I do.

MARK McCLELLAN
Norseman, Western Australia

Thanks for the letter, Mark. I hope that you and your R/C family enjoyed our rally feature in the last issue. Oh, and please forgive Chris; he still thinks that Bush is president, too!

Frank

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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In search of fun
and glory, 'cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE SCOOP



Car Action in Japan



静岡ホビーショー

Shizuoka (pronounced She-zoó-oh-ka), Japan, is famous for green tea, *wasabi* (Japanese horseradish) and the Shizuoka Hobby Show. Every May, manufacturers from all over the Far East and Europe display their products there; it's an R/C'er haven. I know; I've seen it with my own eyes.

Well, this year, our dedicated Executive Editor Frank Masi and Associate Publisher Sharon Warner trekked to the Land of The Rising Sun in the quest of the "Most High-Scoopable." Masi-san was relentless and got the very latest "Scoop"-worthy items of interest—all this while being put on the spot to eat still-living tiny sea creatures. We all owe Frank our gratitude for bringing back the information—and due respect for facing the ordeal of the "squiggly cuisine" like a man. You're a Braveheart, MacMasi!

For a slightly different "twist" on the show, see Shizuoka through Chris's eyes, in "Chris's Back Lot."

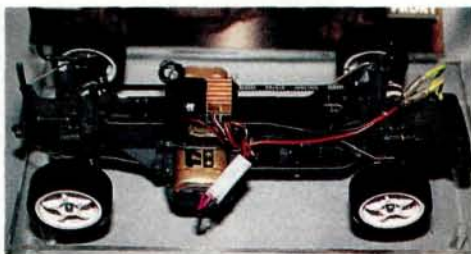


▲ HPI's new **BMW Z3 bodies** for the RS4 touring car. Each body comes with two styles of wing, the roof can easily be removed, and an optional interior can be installed for the roadster model.



▲ This new **Ferrari F50** body from Yokomo was used by Masami Hirotsuka to win the prestigious JMRCA nationals. The body fits the YR-4 and most other narrow-type touring cars.

Here's a better look at ▶
Tamiya's TA03 chassis—
the long-awaited successor to the
TA02 touring car platform.
Note the front-mounted motor
and simple belt drive.



▲ This **1965 Honda S800** is the latest version of Tamiya's popular M-chassis. During the '60s, the S800 set new standards for Japanese car performance and economy and had many European car companies quite worried.

To commemorate ▶
the opening of its new
Kakegawa Circuit racing
facility, Tamiya intro-
duced this limited-
edition **TGX Mk.1**
Calsonic Skyline GT-R
1/8-scale gas racer. This
kit comes with the new
fan-cooled OPS VR-15S
FV engine.

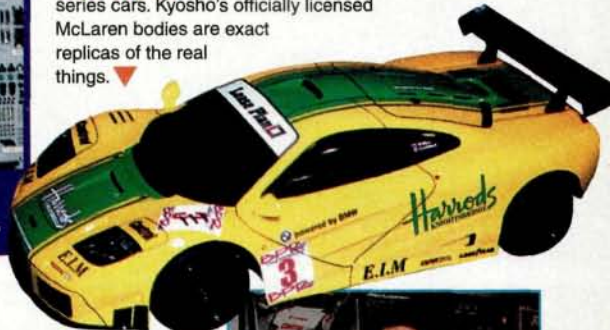


Yashushi Arimura,
designer of the Tamiya TA03.



◀ Mini sport-utes are coming! Here's Tamiya's version of Honda's latest—the **CR-V**—which is based on a lengthened Tamiya Pajero chassis. The highly detailed ABS plastic body is marvelous.

Here's Kyosho's fantastic new **McLaren GT-R "Harrods"** body for the 1/10 scale TF-2 and Pure Ten series cars. Kyosho's officially licensed McLaren bodies are exact replicas of the real things. ▼



After reviewing Kyosho's ▶
SuperTen GP for the July
issue, I wanted to meet the
man responsible for its out-
standing design. Here's
Kyosho's Mitsuru Okano
holding the newest body for
the SuperTen, an STP
racing Porsche.



INSIDE scoop



▲ One of the most significant releases at the Shizuoka show was the **Baja Beetle** from Kyosho. This seemingly ordinary-looking 1/10-scale gas monster bug incorporates a radically new reversing transmission. With this breakthrough tranny, the Beetle can back out of trouble.



Kyosho's innovative ▶ **adjustable clutch** for .10- to .15-size glow engines. A tiny setscrew allows you to set spring tension to adjust automatically when the clutch engages. Clever!



These new Yokomo **touring-car tires** have an inner belt that prevents them from "ballooning" during hard acceleration. ▼



◀ Also seen in the Kyosho booth was this new addition to the Nostalgic Series of Pure Ten scale cars. **The Cobra Daytona** coupe was Carroll Shelby's masterpiece and one of the rarest American collector cars. Kyosho's version looks hot atop the proven GP-10 gas-powered 4WD chassis.



▲ HPI's new **tuning kit** for its RS4 touring car provides better suspension geometry for improved handling. This kit is said to really enhance the narrow RS4's handling.



▲ This prototype of a **new charger** from HPI features simple-to-use controls, an LCD display and even a provision for an external cooling fan.

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▲ Tamiya's cool new **Mercedes-Benz 1850L Tractor Truck** features realistic leaf-spring suspension, an aluminum chassis and hinged rear doors. The cab pivots upward, too!

This is Tamiya's model of the brand-new **Toyota Landcruiser "Prado"** mini sport-ute. Didn't get a close look, but I think that it's based on the Tamiya Pajero 4WD chassis.



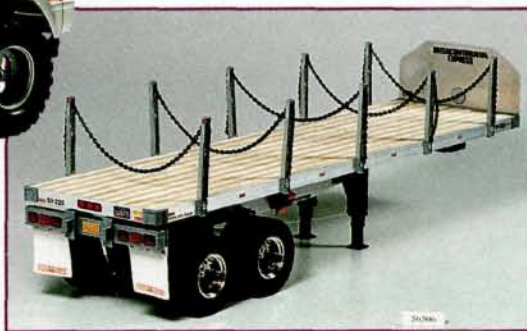
◀ Yokomo's new chassis for the **YR-4 "M"** features adjustable battery cradles that allow you to fine-tune the car's weight distribution.



▲ I spied this new **Sanwa (Airtronics) radio** (above) in the Sanwa booth. It appears to be a budget version of the popular Caliber 3P radio. Sources at Sanwa say that it will be exported to the U.S. through Airtronics. Also while in the sport radio mode, here's the latest from Futaba (right). It's a **sport version** of the mind-blowing Futaba 3PJ computer radio.



▲ KO-Propo's newest is the **Precious Type 96**, which has a lower steering wheel for better ergonomics.



◀ Tamiya's **Flatbed Semi-Trailer** for its 1/4 scale tractor trucks; fits the King Hauler and Globe Liner.

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READERS' rides

RUSTLE UP THE X-MEN

After seeing Greg Raciti's "Looney" ride in our April '96 issue, Kevin Lum of Honolulu, HI, decided to send us a photo of his own R/C truck, which was inspired by *Marvel* comic's X-Men.

Kevin's X-Men rig is a Traxxas Rustler that is controlled by a Traxxas 2020 radio system. The truck has been subtly modified with a Trinity T-Tech 19-turn double and a Tekin Rebel electronic speed control. Kevin cut out the X-Men stickers and applied them to the inside of the body, and then he sprayed the paint over them. He's currently working on a Spiderman body for his brother.



WILD AND DRIPPY

This wild-looking ride comes from Lou LaValle of Cincinnati, OH. Lou's Team Losi Double-XT has been decked out with one of Team Losi's aluminum top shafts, graphite arms, aluminum shock pivot balls, a Trinity Midnight motor, World Tech 1700 cells and a lightweight purple screw kit, MIP CVDs, Gold shock shafts and ball-bearing steering kit, RPM two-stage shock pistons, titanium turnbuckles, a Novak Hammer Pro, a Polaris receiver, a Futaba steering servo and a Magnum Sport radio.

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fifth annual "Reader's Ride of the Year Contest" in the fall of 1996. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



DEVIL RIDE

Jabson Chung of Arcadia, CA, sent us this photo of his first R/C car—a Tamiya Bush Devil. Jabson's truck features a Novak Duster ESC, a Race Prep Power Zone stock motor, Associated Gold shocks in both the front and the rear, a JR NES 4735 steering servo, Futaba radio gear and HPI wheels outfitted with Pro-Line Road Hawgs. Jabson's next projects include two more tricked-out Tamiyas—a modified Mini Cooper and a styled-out sedan. Stay tuned! Maybe you'll see them on this page soon.

BLIZZARD BEATER

Bob Mitchell of Columbus, NJ, sent us this photo of his highly modified Tamiya Clod Buster. Apparently, Bob spent the Blizzard of '96 upgrading his Clod (its third transformation). The truck has been modified with an ESP Clodzilla II chassis, and it features eight chrome shocks, ESP Clodzilla II

modified motors, dual battery packs, front and rear custom-made steering systems and Airtronics radio gear.



MR. PLOW

So how does 11-year-old Brian Post of Bethel, VT, earn extra dollars? Well, in the winter months, he plows the snow out of neighborhood driveways with his Kyosho Tracker.

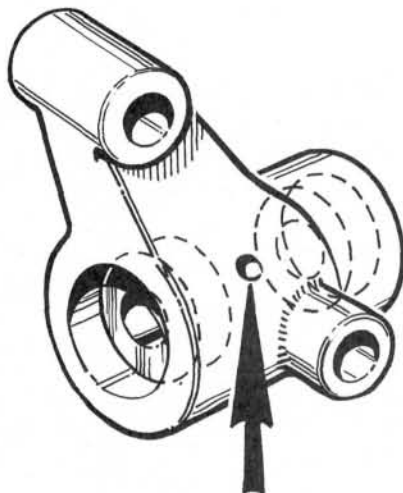


Hey, it could happen, right? He'd just need to recharge his battery a few hundred times to finish the job! In all seriousness, Brian made the snow plow using 1/4-inch pine sticks and a 5x7-inch bent aluminum sheet. To help push the snow out of the way, he also made his own snow chains to fit the Tracker's rear tires. To protect the truck's electronics from snow, ice and water, Brian wrapped all the electronics in plastic and then covered the entire chassis with plastic wrap. He has also modified the truck with an Airtronics radio and a Contender ESC, a Trinity Green Machine 2 stock motor and a PTI battery pack.



PIT TIPS

by Jim Newman



Oil Well

So that oil can be injected into R/C buggies and trucks every 15 or 20 battery packs, drill the rear hub carrier between the bearings to accept a pin oiler spout. Cover the hole with tape.

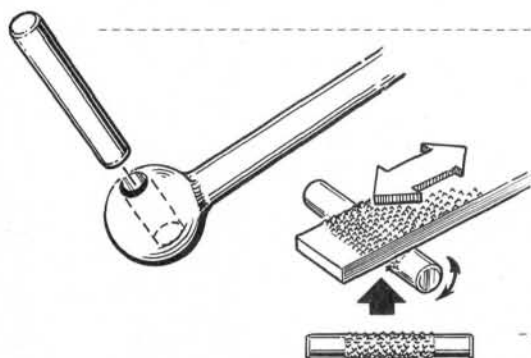
LEONARD GLICK,
Long Beach, CA



Pair of Clips

To avoid losing a lone pin, join your body clips in pairs with brightly colored wire.

MIKE SIMO, Appleton, WI



New Pin

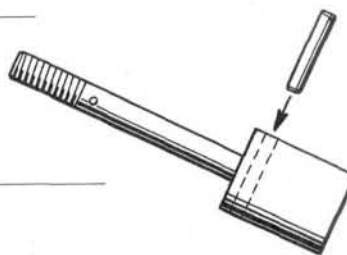
If you shear off or lose a dogbone pin, cut a replacement out of a 10mm-long piece of 2-56 threaded pushrod. Push out the broken piece with $\frac{1}{16}$ -inch-diameter music wire. Roll the middle of the pushrod wire on a steel surface under a coarse file, using a lot of pressure on the file. This will raise burrs that will ensure the tight fit of the new pin.

RICK EYRICH, Winter Haven, FL

USA-1 Shaft Slip

To prevent a shaft from slipping, drill through it where shown, then drive in a $\frac{1}{16}$ -inch (1.5mm) music-wire pin, and secure it with a spot of CA.

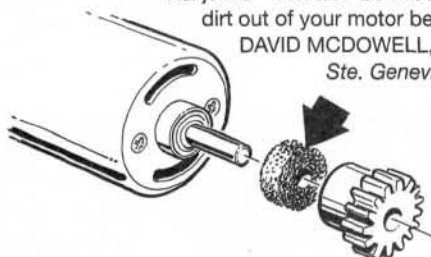
JOHN RIDLEY, Ft. McMurray, Alberta, Canada



Foam Seal

This foam donut—usually used to keep dirt out of ball joints—can also be used to keep dirt out of your motor bearings.

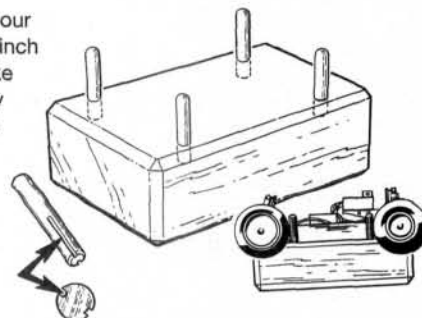
DAVID MCDOWELL,
Ste. Genevieve, MO



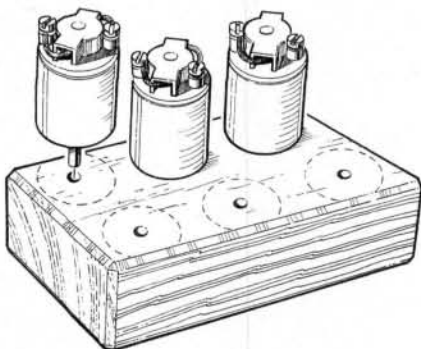
Jack Stand

Make a super servicing stand for your car out of a suitable length of 4x4-inch (100x100mm) lumber, drilled to take four dowels. If the dowels fit tightly in the holes, glue won't be needed to secure them, but it helps to file grooves along their sides to allow air to escape when you drive them in. Paint the block, then glue sponge foam or corkboard material to the top.

JACK FAENZA, Gillette, NY



Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor return unused material.



Motor Caddy

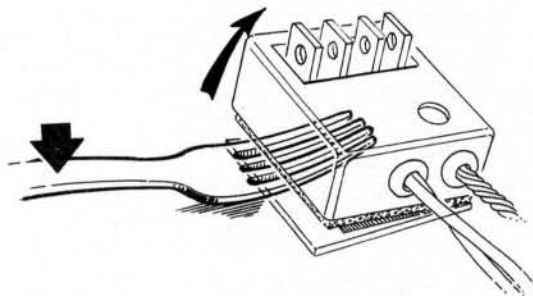
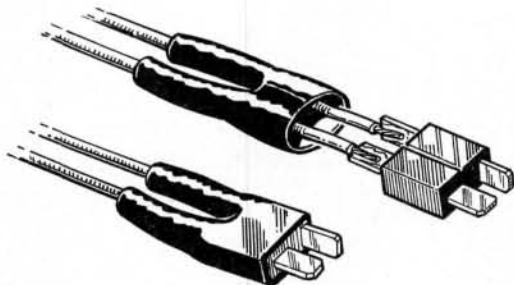
To prevent spare motors from rolling off the bench between servicing, drill a 2x4x6-inch (50x100x150mm) block of wood to accept motor shafts.

JONATHAN GABLE, Lowell, IN

Give it the Boot

For more finger-grip area on your Deans Ultra plugs or similar connectors, use a molded speaker-wire boot instead of shrink-tube.

FELIX LEUNG, Surrey, B.C., Canada



Fork Lift

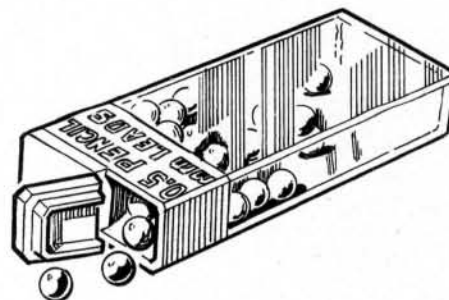
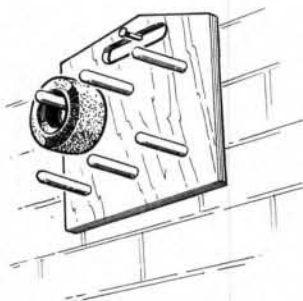
Use a dinner fork to gently pry an ESC off the servo tape that holds it in your R/C vehicle. Dissolve the adhesive by spraying it with a little Lift Off label remover around the edges.

DANIEL STELMACH, Bay City, MI

Ball Control

To conveniently store differential balls, use a drafting-pencil-lead container.

NORMAN JOHNSON, Fork Union, VA



Tire Board

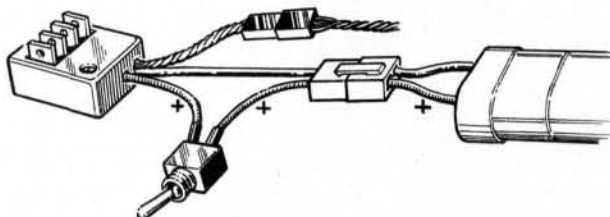
To store tires, drive dowels into a board, and either hang the board on the wall or stand it up like a picture frame.

JONATHAN GABLE, Lowell, IN

Kill Switch

To kill a runaway motor quickly, install a switch that is readily accessible from the outside of the body shell. Cut into the red (positive) lead between the speed control and the pack, then solder in a suitable switch.

ANH HO, McLean, VA



WHAT'S new



PROTOFORM B2 Bomber

Made to fit the Associated RC10B2, this functional 0.030 Lexan body fits the chassis in all the right places to keep out dirt. To cool the ESC and to provide clearance for the electronics, the body's left side has a built-in air intake. It comes with an add-on wing.

Part no.—1511; price—\$15.95.

Protoform, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.



TRINITY Monsters of Dirt Sticker Sheet

Made for your off-road buggy or truck, this new sheet features vibrantly colored stickers in high-tech graphics. The stickers are printed on a new, highly flexible material to stick better to the body's contours.

Part no.—RC9012; price—\$5.99.

Trinity Products Inc., 1905 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



TEAM LOSI Slider Conversion Kit

Designed to fit any Double-X and Double-XT transmission, this new slider conversion kit is ideal for stock- and modified-class racing. The kit comes with a plastic differential and plastic outdrives that weigh less than half as much as the standard steel outdrives and dogbones. Lower rotating weight results in quicker acceleration. The sliders work well when the track is extra slick and bumpy.

Part no.—A-3094; price—\$34.95.

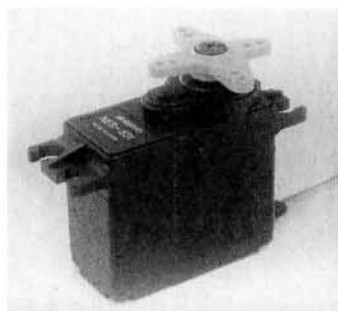
Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9400; fax (909) 590-1496.

JR 531 Premium Sport Servo

This new mid-size ball-bearing servo has a 3-pole motor. It boasts 51 oz.-in. of torque and a tested speed of 0.21 second/60 degrees. It offers precision performance at a sport-level price.

Part no.—JRPS531; price—\$54.95.

JR; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; fax (217) 352-0355.



PERFORMANCE HOBBY Zig Batts

A Zig Batt is a group of battery cells that have been closely integrated through a specialized, two-step matching process to achieve stable, consistent voltage throughout their use, not the discharge time in seconds.

They are available both unassembled and assembled in packs. The unassembled cells come with Dean's battery bars, Dean's Ultra plugs, decals and assembly instructions. These cells boast a long life; the manufacturer will service them.

Part no. and price—call.

Performance Hobby, 1293 NW Wall, #1492, Bend, OR 97701; (800) 308-6160.

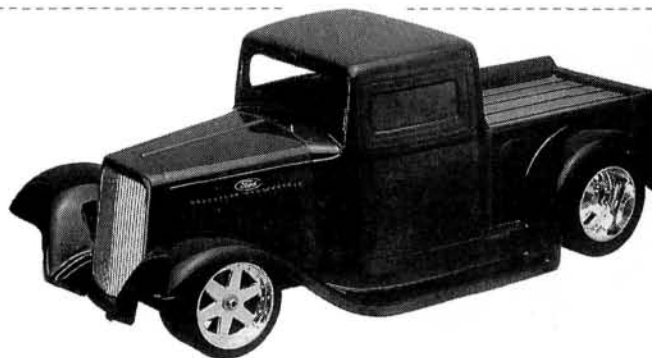


PARMA '34 Ford Truck

Detailed with a simulated wood bed along the true-to-scale lines, the 1/10-scale body will fit on the Parma Good Times chassis; for a trick look, mount it on a monster-truck chassis.

Part no.—10304; price—\$19.

Parma Intl. Inc., 13927 Progress Pky., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.



NOVAK

Duster II Sport

Based on the original Duster Sport MEGAFET, this new version features HYPERFET™ transistors and Polar Drive Technology™. These additions provide smoother throttle response, cooler operation, longer run times and increased radio range. It also has One-Touch Set-Up™, Solid State RVP™ (reverse-voltage protection), digital anti-glitch circuitry, thermal-overload protection and factory-installed motor and battery connectors.

Part no.—1950; price—\$129.

Novak Electronics Inc., 18910 Teller Ave., Irvine, CA 92715; (714) 833-8873; fax (714) 833-1631.



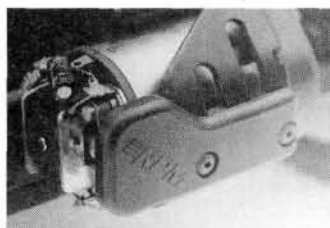
RPM

"B2" Rear Bumper/Motor Protector

Designed to protect the RC10B2's motor endbell during impacts, this ultralight, rigid rear "bumper" is attached to the existing screw holes in the motor plate. It is injection-molded of durable black nylon.

Part no.—8047; price—\$3.95.

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710; (909) 393-0366; fax (909) 393-0465.



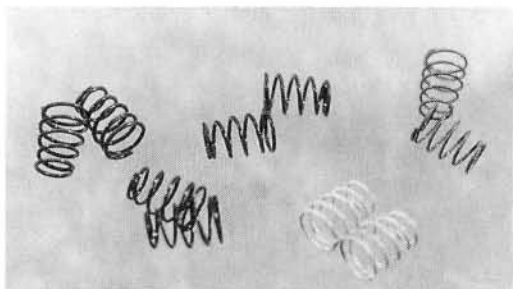
BRP

Front Suspension Springs

Because the tension of these progressive-rate springs increases when the spring is compressed, handling becomes more predictable. The springs are available in six colors in single pairs and in six-pair packs.

Part nos. and prices—5560 (orange, 4 to 6 in./lb.), 5561 (blue, 6 to 8 in./lb.), 5562 (white, 8 to 10 in./lb.), 5563 (red, 10 to 12 in./lb.), 5564 (green, 11 to 13 in./lb.), 5565 (purple, 12 to 14 in./lb.)—\$2/pair, \$12/six-pair pack; 5567 (6-pair pack, one pair of each color)—\$9.95.

BRP Inc., 1575 Lowell St., Elyria, OH 44035; (216) 284-0270; fax (216) 284-0271.



O.S. ENGINES

.12-Size Powerplant

Designed expressly for 1/10-scale car and truck racing, this new engine has slanted fins and a red-anodized square head with V-shaped grooves that use Heat Vent™ technology to provide forced-air cooling. Its crankcase was designed to include bolt-to-bolt backplate webbing, and it features a special groove that prevents oil from leaking out of the front bearing. The new 10E carb comes equipped with a brass sleeve needle with O-ring and a rubber boot around the carb rotor. The .12 CV is available with or without an O.S. recoil-starter system. It comes with the no.102 Super Air Cleaner and no. A5 glow plug. Tuned pipe and header are available separately.

Part nos. and prices—OSMG2010 (without pull-start), \$199.99; OSMG2011 (with pull-start), \$249.99.

O.S. Engines; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.



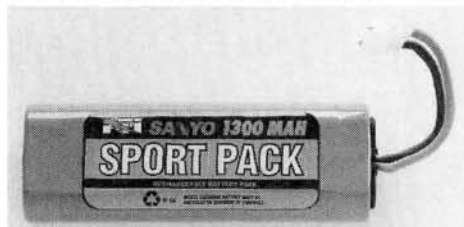
PTI

Sport Pack

Each 7.2V rechargeable battery pack is hand-assembled, then checked for durability and quality. To customize your pack, choose its shrink-wrap color and type of packaging. Every pack comes with a one-year warranty.

Price—\$21.59.

PTI, P.O. Box 950, Pilot Mountain, NC 27041; (910) 368-1375; fax (910) 368-1380.



TEAM ASSOCIATED

Traction Action

This unique rubber softener and conditioner allows tires to grip better on hard-packed surfaces. It works well for all popular on- and off-road rubber tires.

Part no.—6859; price—\$6/4-ounce spray bottle.

Associated Electric Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.



Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by Radio Control Car Action or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in Radio Control Car Action. Manufacturers! To have your products mentioned here, send press releases to R/C Car Action, What's New, 251 Danbury Rd., Wilton, CT 06897-3035.



TROUBLE SHOOTING

by George M. Gonzalez

Stubborn Speed Control

I figured that if anybody could help me with my problem, it would be you. After all, you are the head troubleshooting guru! I just upgraded to a new radio from Futaba—a Magnum AM FP-T2PD. On attempting to calibrate my new radio with

my Tekin G-12 using the QuickTune button, I found that the ESC would not go into the tune mode. Usually, this mode can be identified by the flashing red light. I even tried switching back to my old radio, but I had the same problem.

But wait, there's more. I then tried to calibrate my new radio with my Novak Racer ESC and found that it, too, would not go into the One-Touch Set-Up™. I am led to believe that my new radio is at fault. What is your opinion?

DAVID NOWICKI
WetaMurphy@aol.com

David, I don't think your radios are the problem here. It is ironic, though, that both your ESCs have the same difficulty. I recently had similar trouble with my Tekin G-12. I called Tekin, and they explained that they have had a few problems

with the QuickTune button on the G-12 because it is not sealed from the elements. Some dirt or grime may have found its way into the EPROM chip under the button and fouled things up.

I also called Novak, but I got a different story altogether. They have had very few complaints about faulty One-Touch Set-Up™ buttons. They have, however, had a couple of ESCs come in for service with their One-Touch Set-Up™ buttons damaged by being pressed down too hard.

This might be a silly question, but are you holding down the button long enough? The button on the Novak ESC needs to be held down for 3 seconds, and the Tekin ESC button must be held down for 5 seconds before either will switch to the setup mode. Also,

your receiver's throttle channel (channel 2) might be damaged, which would make it impossible to set up your ESC. Did you reverse any of the ESC's wires in the plug that goes into channel 2 in your receiver to accommodate a different receiver? If so, you might have reversed the polarity and damaged the unit.

I suggest that you send your ESCs in for service. Both Tekin and Novak have extremely quick turnaround times, so you'll only be down for a couple of weeks.

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.



Clueless in Seattle

I just picked up a new Traxxas Nitro Stampede that came fully assembled with the radio gear installed. The truck ran great for about a month, but now I can't get it to run. The engine comes to life after a few tugs, but it stalls the moment I remove the glow-plug igniter. I messed around with both the low- and high-end needle valves as well as the idle-adjustment screw to the point at which I think I've thrown the settings way off from their original factory settings. I don't know what the problem is, and I'm not sure where to set the needle valves. The hobby shop owner said that I need a new piston and sleeve, but I've run only about 3/4 of a gallon of fuel through the engine and can't believe that it

has to be rebuilt already. Please help!

DAVID ACHORD
Seattle, WA

David, you didn't mention which kind of fuel and glow plugs you use, and that's important. First, adjust all your needle valves correctly. Traxxas recommends that you open the low-end needle valve to 1 1/2 turns from fully closed. The high-speed needle should be open 2 1/2 turns from fully closed. Set the idle-adjustment screw so that the carburetor barrel is open about 2.5mm.

Next, install a fresh glow plug. Traxxas recommends that you use only standard, long glow plugs. If possible, use Traxxas glow plugs

or McCoy MC-9s only. According to Traxxas, you should use only fuels by Byron, O'Donnell, or Dynamite (Blue Thunder), and keep the nitro content between 10 and 20 percent. These high-

quality fuels have a high percentage of castor oil.

You might as well replace all the fuel lines because rubber tubing is inexpensive, and you don't want a pinhole leak. While you're at it, check the seal on the fuel tank lid for leaks, and replace the tank if necessary. Also check the manifold gasket for leaks; if fuel drips from the exhaust manifold, you should replace the gasket as well.

If all else fails and the truck still won't run, call the Traxxas help line at (800) 323-0069. The folks there want to help you, so give them a call. You'll be glad you did.



Stuck in Reverse

I own a relatively new Tamiya M02 car that's decked out with an Alpine A110 body. When I bought it, I was under the impression that it was FWD like the Mini Cooper, but I found out that it's actually RWD. I installed a Novak Explorer ESC and a Trinity Midnight stock motor, and I use a Futaba Magnum Jr. radio with an S148 steering servo. I have a couple of questions that I hope you can answer for me. First, after I had completed the car, I took it out for a trial run and noticed that it went in reverse when I squeezed the trigger but braked normally when I applied the brakes. I tried to use the servo-reversing function on my radio, but then the car braked when I squeezed the trigger and went in reverse when I put on the brakes. All of my friends are baffled by this, and my hobby shop couldn't help. Second, can I convert my M02 into an M01? All the guys who race minis around here say that the FWD M01 cars handle much better. Is this

true? I checked out an M01 Mini Cooper chassis that belongs to one of the racers in my club, and it looks almost identical to my M02. Can this conversion be done?

MIKE DELGADO
Alhambra, CA

Mike, the M02 chassis cars are designed to use reverse-rotation motors. This should explain why your car runs in reverse when you squeeze the trigger. You can do one of three things: pick up a reverse-rotation motor, such as Trinity's Reverse Rotation Midnight stock motor (this motor is hot!); get a motor with adjustable timing, such as Tamiya's M-chassis Acto-Power motor (you'll have to adjust the timing as directed in the instructions if you choose this motor); or buy a Tech Racing Super M-chassis bulkhead/tranny case, part no. TFM-17(A), which allows you to use an ordinary forward-rotation motor without modifica-

tion. The Tech Racing M-chassis super bulkhead/tranny case is available through Greater Hobby International/Ultimate Hobbies at (714) 921-0322.

Converting your M02 chassis into an M01 configuration is extremely easy. Install your servo on the other side of the chassis. You will find an identical set of servo-mounting holes. Next, install the front steering-bellcrank system, suspension arms, uprights and steering blocks on the rear bulkhead, which contains the motor. This will become the front of the car. Next, install the rear suspension arms and axle carriers on the other bulkhead. This is now the car's rear end. Then replace the piano-wire steering link that came with your kit with the longer steering rod that comes with a Tamiya M-chassis turnbuckle

steering set (part no. 53246). Finally, swap the body mounts. (Install the rears up front and vice-versa.) You will now have an M01 chassis. Keep in mind, though, that the M01-chassis cars use a regular forward-rotation motor.

You also asked which M-chassis car handles better—the M01 or the M02. This is a tough question, and I'm going to tell you my personal preference, which may not fit the majority. The FWD M01 pushes a bit, while the RWD M02 hooks slightly. I prefer a car that pushes to one that hooks. The nice thing about the M-chassis cars, though, is that you can try each configuration and decide for yourself. Good luck.



Frankenstein Motor

I have a Maxtec 16-turn quad motor. My problem is that the last time I ran it, a big cut or gash appeared on the commutator. Can I go to a hobby store and have them cut the comm on a lathe, or if that doesn't work, could I just buy a new armature? I've looked, but no one seems to sell just Maxtec armatures. Could



a Trinity Kinwald Dirtinator armature fit in the motor?
RODNEY ZEE
zee88@aol.com

Rodney, many hobby stores, especially those with tracks, do cut comms. If they don't, chances are some racer will do it for a few bucks. You can also check out some R/C racetracks in your area.

If your comm has been damaged beyond repair, you can pick up a new armature in any wind you want. Maxtec motors are tweaked-out versions of Epic motors. Trinity is the sole distributor of Epic

motors, and most hobby shops have Trinity motor accessories. And yes, the Kinwald Dirtinator armature will slip right in—no problemo.

If you install a new armature, make sure you don't lose any of the thin motor spacers when you remove the damaged armature. To ensure proper timing, mark the can and endbell with a scribe so you'll be able to fasten the endbell exactly where it was originally. I would, however, have the motor dyno-tuned to ensure that the timing is set for optimum performance.



M.troniks Monster FET

M.TRONIKS may be a new name to you, but you all know Trinity Products* and have learned that when they introduce a product, it is probably noteworthy. New from Britain, the M.troniks Monster FET forward-only (racing style) electronic speed control (ESC) is now available here, thanks to Trinity.

The ads and product literature give the impression that this ESC is primarily intended to replace the mechanical controls found in most entry-level cars, but it can handle 14- to 15-turn modified motors, so it's a good choice for serious Street Spec racers, too. With a list price of \$79.99, the Monster FET is priced right.

The case is a fairly standard locking tab unit, but glue on two of the tabs prevents it from popping open in a hard crash. It also makes my job harder; you know I *have* to look inside (don't try this at home!). The Monster's innards are very well-made: a single, custom, integrated-circuit chip keeps the parts count and price down and the reliability up.

LAB LOWDOWN

TEST 1—RESISTANCE

Today's R/C cars run on relatively low voltage (7.2 to 8.4 volts) and high current (20 to 30 amps), and any loss in voltage caused by an ESC's resistance can significantly reduce performance and cause overheating. In an ESC, low

resistance is vital.

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

• **Voltage drop along the full length of the wires:** 0.21 volt—a resistance of 0.0175 ohm.

• **Voltage drop 2 inches along the wires:** 0.10 ohm—a resistance of 0.008 ohm.

These readings are higher than you would find in an all-out pro model ESC, but they hold their own against most of the sport model ESCs I have tested, including some that cost a lot more.

TEST 2—OVERHEATING

I "cook" every controller I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps. I did install the supplied heat sink, but its fit was a little loose, so I gently bent the fins until it fit well. I didn't provide any cooling from a fan.



I let the controller cook for 15 minutes—like dumping three or four battery packs in a row. After 15 minutes, the controller's heat sink was too hot to touch—about what I expected, following those resistance readings—but the Monster FET was still operating normally.

When I test an ESC, I observe the motor-drive output on my oscilloscope, and I realized that the motor drive was neither truly high frequency (2500 cycles per second) nor standard frequency (around 60 cycles per second); I noted 1800 cycles per second, and the instructions say this is to be expected with the Monster FET. This might not be quite as efficient as a pro model ESC, but 1800Hz is fast enough to provide a much smoother throttle response than the standard 60Hz frequency of some economy models.

MONSTER MIGHT...?

My MRC MT-10S truck is my primary test vehicle and my primary fun vehicle! For me, fast means fun, and to be assured of fun, I've bolted a Trinity Kinwald modified motor to the transmission. I've adjusted the gearing to

provide a 4-minute dump; the gearing determines current levels. Modified motors, because of their fewer turns, like to turn mega-high rpm, and if you use the same gearing on a mod motor as you use on a stock motor, it will draw excessively high current and may well perform poorly. So, when you install a modified motor, be prepared to install a much smaller pinion, or you could easily smoke your motor, your ESC and your wallet.

To the rear shock tower of my MRC MT-10S, I've bolted an L-shaped platform that's a convenient spot for an ESC—good air flow. The Monster FET comes with a full set of connectors, so installation was quite easy. With slight modification (fully described in the instructions), the Futaba receiver connector fits most of the receivers on the market.

With the Monster FET

WHAT IT HAS

- 3 FETs—two for forward, one for brake.
- Two built-in potentiometers—neutral and full speed.
- Built-in pulse-checking LED.
- Factory installed battery and motor connectors.
- Monstrous 14AWG battery and motor wires.
- Heat sink, motor capacitors, decal and instruction sheet.



installed, I matched it to my Futaba Magnum AM transmitter. The Monster

SPECIFICATIONS

DIMENSIONS

Height (w/out heat sinks)0.86 in.
Width1.44 in.
Length1.70 in.
Weight (with heat sinks)2.1 oz.

TUNING

Access to controls.....Good
Ease of adjustmentFair

LIST PRICE/WARRANTY.....\$79.99/90 days

ELECTRICAL (Mfr's. Specs)

Max./min. voltage6/7 cells
Max. currentUnlisted
Continuous current.....Unlisted
ResistanceUnlisted

TEST PARAMETERS

Voltage6 volts
Current.....12 amps
Voltage drop
—along full length of wires0.21 volt
—2 in. along wires0.10 volt
Calculated resistance*
—along full length of wires.....0.0175 ohm
—2 in. along wires0.0083 ohm
BEC output, 6-cell battery5.05 volts
*Resistance = Voltage drop ÷ Current

COMMENTS: the Monster FET is a new British product imported by Trinity; ideal for Street Spec racing—killer performance at a reasonable price; resistance was on a par with those of typical budget-price ESCs and higher than those of expensive pro models; with a fairly serious modified motor that dumps in 4 minutes or less, it got hot, but it never stopped pumping current; acceleration was good; screaming top speed; a lot of ESC at a great price.

has two potentiometers—one for neutral and one for full speed—and they're set quite deep, so to make adjustments, you must use the supplied tool or a small jewelers' screwdriver.

The pots will rotate 360 degrees, so it's impossible to strip them. But the neutral pot has a very wide range—all the way from full bore to no run—so as you turn the pot, the motor may go to wide open unexpectedly. For this reason, when you adjust the pots, be very careful to have the car's drive wheels off the ground, and it goes without saying, keep your hands clear.

I turned the neutral pot until the motor stopped running. Next, I tried to set the full-speed pot, but I couldn't get full speed (as verified by the pulse-checking LED). The problem once again was the wide range of the neutral setting. It had the controller well into the braking range instead of at neutral. Some adjusting between neutral and full speed soon had the Monster FET behaving as I expected it should, but setting it is a little tricky (especially for novices).

With a little patience and a thorough reading of the instruction sheet, however, it can be done. The good news is that you only have to do it once.

Mother's Day brought grandchildren to our house—willing test drivers! I had charged half-a-dozen battery packs, so we all had a turn at driving the MRC MT-10S equipped with the Monster FET.

The modified motor/Monster FET ESC combination proved to be *hot*. The test crew just about caused motor meltdown because they didn't want to wait to let things cool between runs; the motor got extremely hot, and the batteries were quite warm. After a run, the Monster FET's heat sink was also quite warm but the controller performed without a glitch. Speed was good, acceleration brisk, and the brakes are adequate. For a budget-price controller, the Monster FET stands tall.

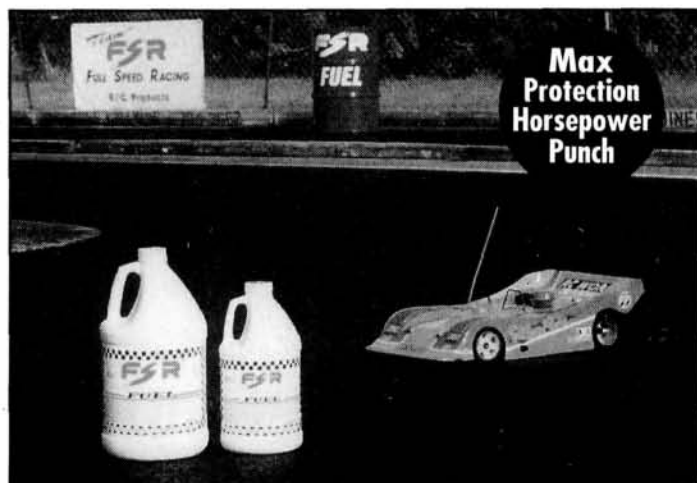
AND FINALLY...

To keep down the cost of racing and allow more of us to join the fun, Trinity recently introduced a racing class known as Street

Spec parking lot. This class restricts how much you can spend on your chassis, body, motor and ESC. The Monster FET may well be a good choice for this class. Its price is definitely in keeping with the spirit of spec racing, and it should be competitive. You're limited to stock motors, standard (as in cheap) battery packs and fixed gearing, all of which produce long run times and demand less of a speed control. Because of this, in Street Spec racing, the difference between having the most expensive ESC and having the Monster FET will barely be noticeable, and driving skill and having fun will be what really count.

If you still run a resistor-style speed control in your backyard buggy and want to give its performance a big boost, check out the M.troniks Monster FET—especially its great price. It's backed by Trinity, so you know that if you ever have trouble with it, they'll be there to provide support.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■



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GETTING STARTED

by Brian Leslie

Beginners' Tidbits

THERE ARE MANY key adjustments to make when you set up or assemble an off-road R/C car or truck.

These require patience and the proper techniques. This month, I cover how to adjust your ball-type differential and

slipper clutch, how to break in a new electric motor, how to set the gear mesh between the pinion gear and the spur

gear, how to set the chassis ride height and how to check front-wheel toe-in and camber.

DIFFERENTIAL

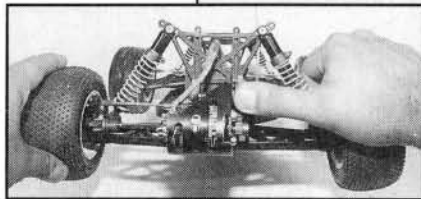
Adjusting your ball differential definitely falls in the "key adjustment" category. A properly adjusted diff is essential to good power transfer from the transmission to the rear wheels, and it's one of the adjustments that determine how well your car will corner.

To adjust a new or rebuilt diff, tighten the diff-adjustment screw until slight pressure is applied to the diff assembly—enough to just keep the assembly held together. Tighten the adjustment screw, and slowly work the diff back and forth with each turn (about $\frac{1}{2}$ turn at a time). This technique prevents flat spotting on the diff rings.

For the final adjustment, refer to your manufacturer's recommendations. Not all differentials are the same. For example, Associated* recommends that you tighten the Stealth diff until the diff spring bottoms out; then back out the screw $\frac{1}{4}$ to $\frac{1}{2}$ turn. You may need to adjust other diffs according to feel.

Once you have set the diff, there are three ways to test its tightness and overall feel:

- 1. Use this method only if you set the diff while it's installed in your car or truck. Hold the right rear wheel and the spur gear with one hand. Now try to turn the free wheel with your other hand. If the free wheel turns easily, your diff is too loose and should be tightened $\frac{1}{8}$ turn at a time until it no longer slips.
- 2. Spin either rear wheel. The diff should feel very smooth and not bumpy or gritty. If it doesn't feel perfectly smooth, it's too tight. Loosen it, then repeat the first test.
- 3. The third test applies to a diff that is out of the car. Place a flat-blade screwdriver in each outdrive hub, and then try to spin the main diff gear. If the diff is set correctly, it should be nearly impossible to move the gear.



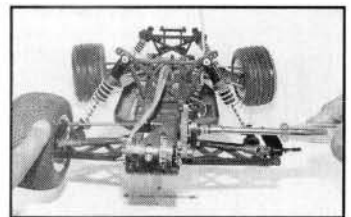
SLIPPER CLUTCH

The slipper clutch is vital to drive-train performance and durability. A properly set slipper will enhance drivability and lengthen the life of the transmission and drive-train assemblies.

To set the slipper clutch, tighten the slipper-clutch adjustment nut as tightly as possible. Place the car on the ground, and apply pressure to the rear end. Try to turn or move the spur gear. Unless your name is Arnie, it should be impossible to move. Loosen the slipper adjustment a few turns until you can move the spur gear with moderate effort.

To set the slipper, set the car on the racetrack, and perform a full-throttle takeoff from a dead stop. A properly set clutch should slip for the first 2 to 3 feet from a standing start under hard acceleration before it fully engages. If the clutch grabs too early—say, at the 1-foot mark or less—the car will be difficult to control coming out of tight turns, where the rear end will want to kick out sideways. In addition to throttle-control problems, a tight clutch can cause excessive damage to the transmission gears and drive shafts when you exit turns under hard acceleration and when you land off jumps.

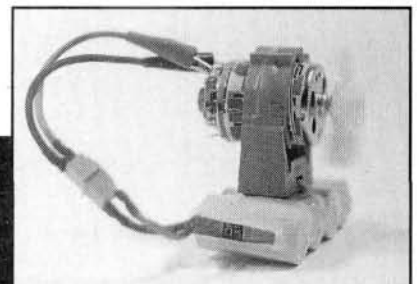
If the clutch is set too loose, it will slip excessively, waste power and never really allow the car to get up to full speed. Eventually, the clutch will glaze over, and it will need to be maintained or replaced before it can be set correctly again.



MOTOR BREAK-IN

How you break in a motor is usually a personal choice. Ask 10 racers how they break in their motors, and you're likely to get 10 different answers. There is, however, one proven method: place one drop of your favorite brand of comm drops on each brush. Connect a fully charged 4-cell pack (about 4.8 volts) to the motor, and run it for about 4 minutes. Check the brushes for wear. The brushes should be at least 50 percent broken in. In other words, the face of the brush that makes contact with the motor's armature should have at least 50 percent of its face curved in the shape of the armature. If the face of the brush is still almost flat, then run the motor for another minute or so, and check the brushes. Repeat the procedure until the brushes are about 75 percent broken in.

To keep the motor cool during break-in, place a fan on the motor. Race Prep* makes a complete break-in kit that includes a motor stand, a 4-cell pack and a fan that is connected to the armature.



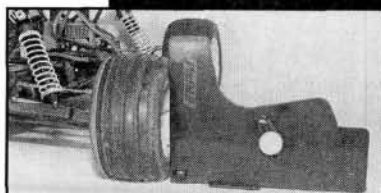


SETTING TOE-IN AND CAMBER

Like ride height, toe-in/out and camber adjustments are a topic in themselves.

• **Camber.** This describes the angle at which a tire leans when viewed from the front or rear. Negative camber means that the top of the tire leans toward the inside of the chassis; positive camber means that the top of the tire leans outward. Positive camber is seldom, if ever, used.

To check or set camber, place an object alongside the tire that's perpendicular (90 degrees) to the ground (a can of motor spray will do in a pinch). Measure the distance between the object and the top of the tire. For most off-road buggies and

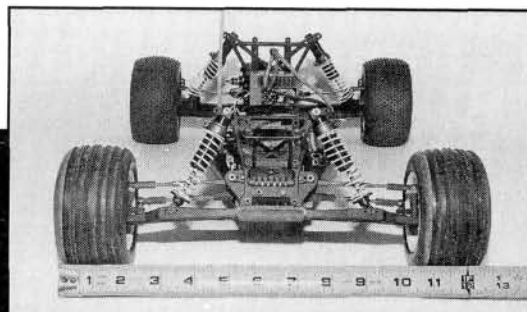


trucks, a distance of between $\frac{1}{16}$ and $\frac{1}{8}$ inch from the top of the tire to the perpendicular object will give about $1\frac{1}{2}$ to 2 degrees of negative camber—a good starting point. For on-road, about

$\frac{1}{16}$ inch ($1\frac{1}{2}$ degrees of negative camber) will be fine.

To a degree (pun intended), more negative camber allows better straightaway stability and increases initial turn-in; however, it also takes away a little mid-turn steering and can make the handling a bit "twitchy" at high speeds.

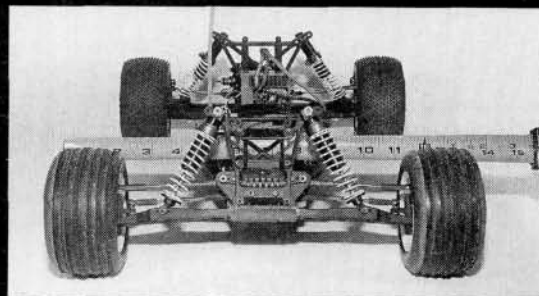
To make this task easier, RPM* makes a nifty, adjustable camber gauge that not only simplifies the task of adjusting camber, but it's also very accurate.



• **Toe-in/toe-out.** Toe-in means that the front tires point inward (when looked at from above); toe-out means that the tires point outward. Toe affects steering and straight-line stability.

To set *toe angle* (this term describes both toe-in and toe-out), simply measure the distance between the insides of the front of the wheels, and then measure the distance between the insides of the back of these wheels. For toe-in, you'll want the distance between the fronts of the wheels to be less than that of the rears (about $\frac{1}{16}$ inch is a good starting point; this equals about $1\frac{1}{2}$ degrees of toe-in). For toe-out, simply make the front distance slightly greater than that of the rear.

Toe-in generally adds straight-line stability but lessens speed. Toe-out tends to increase steering; however, stability is decreased on the straights.



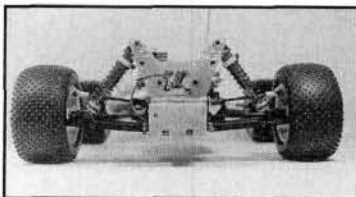
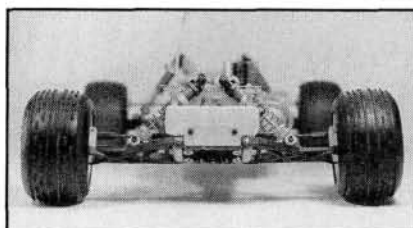
CHASSIS RIDE HEIGHT

There is more to chassis ride height than just how far the chassis sits off the ground.

Whenever you lower or raise the chassis, you change how your suspension will perform over jumps and bumps and through turns. (For an in-depth look at ride height and its effects on cars' handling, see "Getting Started" in the May '96 issue of *R/C Car Action*.)

Generally, you want the rear of the car to sit about $\frac{1}{16}$ to $\frac{1}{8}$ inch lower than the front. This usually means that the rear A-arms should be just "below level" and that the front A-arms should be about level. To gain more steering, lower the front-end ride height; to gain more rear

traction, lower the rear-end ride height.

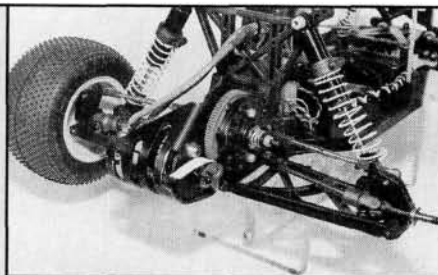


GEAR MESH

For long life of the pinion and spur gears, gear mesh is critical. To set gear mesh, place a piece of paper between the spur gear and the pinion gear. With the motor mounts loosened, slide the motor toward the spur gear until the two gears meet. Tighten the motor-mount screws, and turn the spur gear until the paper comes out. You should be able to just barely rock the pinion gear back and forth without making the spur gear move.

If the mesh is too loose, the gap between the teeth of the pinion gear and the spur gear will allow backlash, which results in a jerky-jerky motion between the transmission gears and the rear wheels. If the mesh is really loose, the teeth will literally be stripped off the gear (usually the spur gear) when you accelerate or land off a jump.

If the mesh is too tight, you will kill your speed and run time, and eventually, you will burn up your motor. As I said, setting the gear mesh setting is critical.



*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

TAMIYA'S* M-chassis cars (M01 and M02) have already captured the hearts of racers and enthusiasts worldwide. I honestly believe that the popularity of these cars is directly attributable to the many cool-looking body shells that are available, and their irresistible size adds to their success. But their small size and limited suspension make these cars a challenge to drive on all but perfectly flat surfaces. On the positive side, like other Tamiya kits—specifically, the TA02—these kits have literally hundreds of available hop-up parts. Many of these parts will dramatically improve performance, tunability and reliability, while others will just make a car look trick.

Tamiya, HPI Racing*, Kose*, Full Speed Racing* (FSR) and Tech Racing* all offer hop-ups for this versatile chassis. In addition, aftermarket body shells that were designed for flat-out performance, not scale looks, are also popping up. Originally, I wanted to combine several of the hop-ups available from these particular manufacturers to make one "super mini" that could be dialed in to work well on any track. I found out, however, that each of these companies offers a complete line of hop-ups for the M-chassis cars, and many of the parts are not compatible with hop-up parts from other companies. For this reason, I decided to build four completely different cars. For each car, the major hop-up components come from one of the aforementioned companies. This way, I can show you what each company has to offer.

by George M. Gonzalez

Project

M



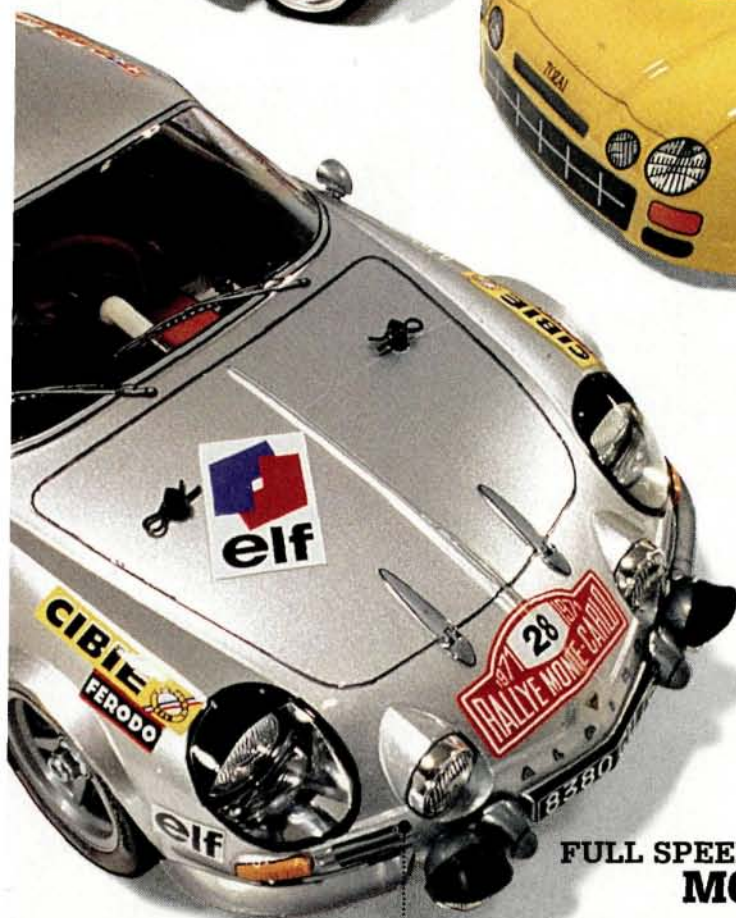
**TECH RACING
4WD M01**



**HPI RACING
M01**



**KOSE
M01**



**FULL SPEED RACING
M02**

Battle of the Minis

Tech Racing 4WD M01



Full Speed Racing M02



Kose M01



HPI Racing M01



Full Speed Racing M02

Aluminum—

- Lower suspension arms (F/R)—part no. FSR-TM-04
- Front steering blocks—FSR-TM-08
- Front caster blocks—FSR-TM-10
- Steering bellcrank set—FSR-TM-12
- Arm pin holder—FSR-TM-16
- Rear hub carrier—FSR-TM-18

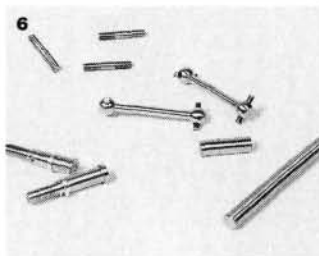
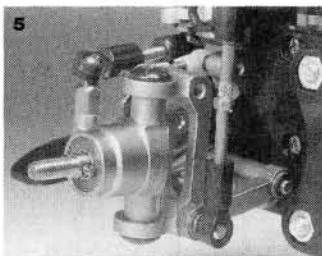
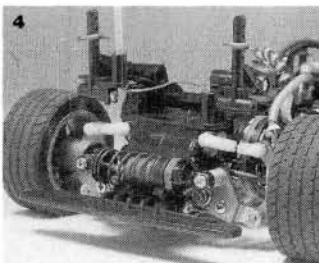
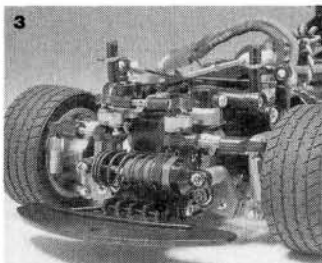
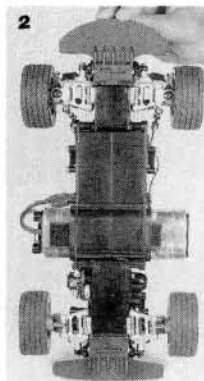
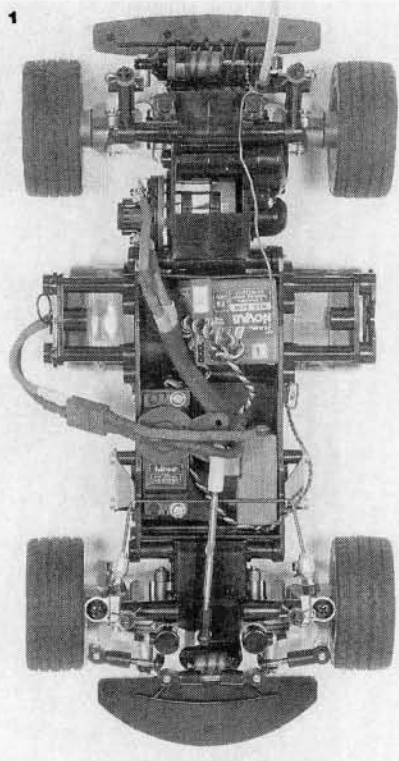
Titanium—

- Dogbones—FSR-TM-22
- Steering-adjustment-rod set—FSR-TM-24
- Gear-shaft set
- Axles (installed in front)

OTHER COMPANIES

- **Associated*** .56 team shocks—6434
- Green spring (front)
- **Novak*** Racer ESC
- NER3FM FM receiver
- **Tamiya** M-chassis sealed ball-bearing set—53206
- M-chassis 4x65mm aluminum screws—53234
- M-grip rear and kit stock front tires
- Alpine A110 body—1825142
- **Trinity*** Midnight reverse-rotation motor
- EX-Tech 1700 battery pack
- **Airtronics*** Caliber 3P transmitter
- **Deans*** Ultra plugs
- **Hitec*** HS 605BB high-speed servo
- **Kimbrough*** large servo-saver
- **Lunsford*** 2.5-inch Punisher titanium tie rod
- **Yokomo*** Gold spring (rear)

Call Full Speed Racing at (214) 618-7038 for prices and availability.



1. Besides the Tamiya front swaybar and Lunsford Punisher titanium turnbuckle steering arm, the FSR Mini may look stock, but not all pictures tell true stories. 2. The flip side shows that there's a complete set of machined-aluminum suspension arms. 3. This front-end view shows the Associated hard-anodized team shock that's equipped with a two-hole piston, 40WT oil and a Green spring. Look more closely, and you'll see the aluminum suspension arms, shock mounts, uprights and steering-bellcrank system. 4. The rear end is equipped with another Associated team shock, aluminum suspension arms and axle carriers (uprights). Check out the homemade adjustable camber links. 5. A better view of the bulletproof front suspension. Machined-aluminum suspension arms, uprights and steering blocks. 6. Here are some of the parts you can't see on the assembled car: titanium turnbuckles, dogbones, axles and transmission shafts.

LIKES

- Bulletproof suspension.
- Amazing quality, fit and workmanship; FSR has mastered the art of CNC machining.
- Extremely trick titanium suspension shafts, turnbuckles, axles and dogbones.
- Aluminum steering bellcrank arms effectively remove all the slop.
- Excellent handling on smooth tracks.

DISLIKES

- The aluminum suspension arms, like those on the HPI car, make the car a little wango-tango on bumpy surfaces.
- The car actually weighs more than the stock M-chassis car.

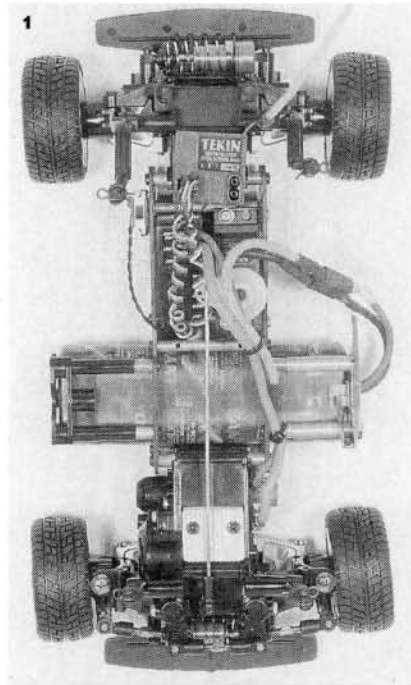
HPI Racing M01

- Mini graphite chassis—part no. 8108
- Mini aluminum suspension arms—6251
- Mini Super Idler gear—6237
- Mini Super Star wheels—3630
- Mini Super radials—4530
- Suzuki Wagon-R body—7200

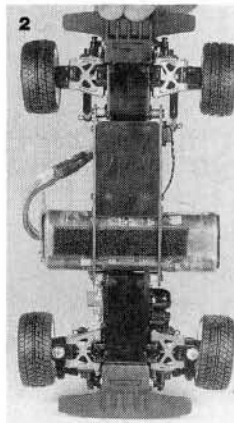
OTHER COMPANIES

- **Tamiya** M-chassis quick-release battery holder—53238
- M-chassis aluminum motor heat sink—53241
- M-chassis hollow-carbon gear-shaft set—53237
- M-chassis sealed ball-bearing set—53206
- Low-friction aluminum damper set—53155
- Acto-Tuned M-Special motor—53251
- **Tekin*** G-12c ESC
- TFM 75 mini receiver
- **Airtronics** Caliber 3P transmitter
- **Deans** Ultra plugs
- **Hitec** HS605BB high-speed servo
- **Kimbrough** large servo-saver
- **Lunsford** titanium tie rods
- **Trinity** EX-Tech 1700 battery pack

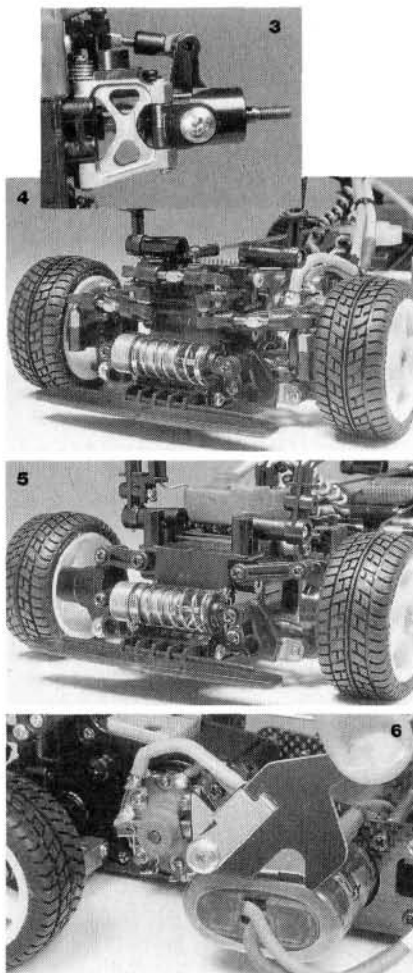
For more information on this car, call HPI at (714) 837-3250.



1. The HPI graphite chassis is in tune with the M-car's original tub chassis design, but it's



much lighter and extremely rigid. Check out the Tamiya aluminum motor heat sink and the HPI Super Radial tires. 2. The flip side reveals the Kydex radio plate on which you mount all your electronics and the aluminum suspension arms. The original battery placement remains unchanged.



3. The HPI aluminum suspension arms are precision-made with CNC milling equipment. They won't flex no matter what, and that makes them the hot ticket on extremely smooth tracks. 4. The rear end remains pretty much stock except for the Tamiya aluminum oil-filled shock and HPI suspension arms. 5. I replaced the original non-oil-filled shock with a Tamiya aluminum oil-filled shock and a soft F101 Silver spring. Check out the Lunsford Punisher titanium tie rods. The HPI Super Star wheels are pretty trick. 6. The Tamiya M-chassis quick-change battery holder is a must-have hop-up. Battery changes are quick and hassle-free.

LIKES

- Light and rigid chassis.
- Excellent quality and workmanship.
- Chassis accepts many Tamiya hop-ups.
- Practically indestructible machined idler gear.
- Idler-gear shaft is fixed to the tranny, so it won't fall off every time you remove the gear cover.
- Cool-looking wheels.
- The HPI radials are the best tires available for M-chassis cars.

DISLIKES

- Aluminum suspension arms are really trick, but they make the car handle erratically on bumpy tracks.
- Chassis should have been designed so that the battery pack could be mounted closer to the ground for better handling.
- The steering bellcrank was not improved, except for the addition of Lunsford Punisher tie rods, so the steering system remains sloppy.

Tech Racing 4WD M01

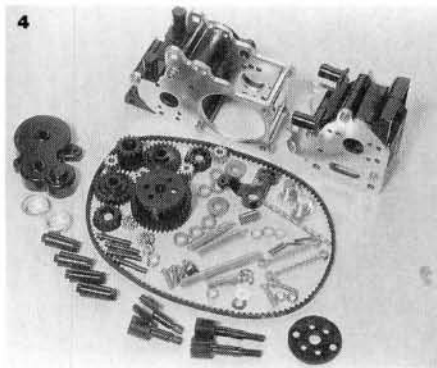
M-chassis—

- 4WD conversion kit—part no. TFM-19
- Two Equa-Pressure Super mono-shocks—TFM-9F
- Front torque rods—TFM-7F
- Rear torque rods—TFM-7R
- Reinforcement rods—TFM-6
- Ultralight aluminum gear shafts—TFM-14
- Aluminum steering bellcrank supports—TFM-23
- Universal drive shafts—TFM-11
- Aluminum bumper/skidplate—TFM-22
- Ultralight 4x65mm aluminum chassis screws—TFM-5
- Heavy-duty kingpin screws—TFM-15
- Heavy-duty steering tie rod—TFM-13
- Quick-release shock mounts—TFM-16
- Lightweight aluminum servo mounts—TSC-6
- 3-spoke wheels—TMH-ER
- 3-spoke wheels (wide)—TMH-ERW
- High-performance radials, tread pattern "A"—TMT-1S
- High-performance radials, tread pattern "A" (wide)—TMT-1SW

OTHER COMPANIES

- Novak Explorer ESC —NER3FM receiver
- Tamiya M-chassis sealed ball-bearing set—53206
- Manta Ray ball-diff set—53070
- Airtronics Caliber 3P transmitter
- Dahm's* Killer Bee body—D222
- Deans Ultra plugs
- Kimbrough large servo-saver
- Maxtec* Black Night Dyno Select stock motor
- Trinity EX-Tech 1700 battery pack

For Tech Racing products, call GHI at (714) 921-0322 for parts and availability.

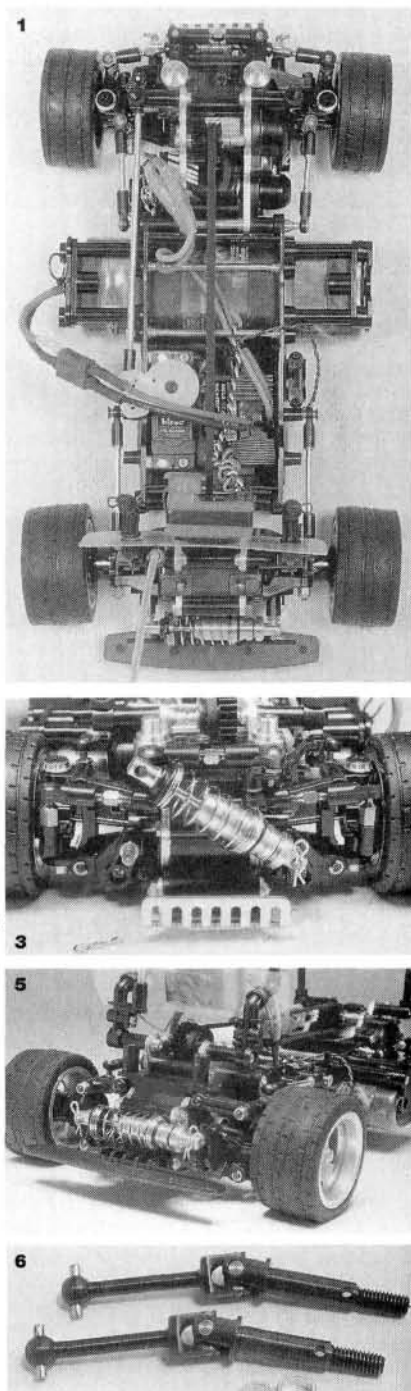


LIKES

- Interesting concept!
- Car handles like a mini 4WD sedan.
- Excellent materials and workmanship.
- Awesome wheels and tires, especially the wide rears.
- Conversion will work with both M01 and M02 cars.
- Looks like something from a RoboCop movie (impressive).
- Excellent universal swing shafts, rear axles, aluminum gear shafts, steering reinforcement kit and turnbuckle steering arm.

DISLIKES

- A bit pricey.
- A little noisy.
- Very complicated.
- Limited space to mount electronics.
- Too many gears are exposed to the elements (don't run it on dirty parking lots).
- A pain to work on.
- Not legal at most tracks.



1. As you can see, this is no ordinary mini. It's in a league of its own. Controlled 4WD drifts, amazing cornering ability and ballistic speed are what you can expect with this 4WD conversion kit. 2. Turn the car over, and you get a good view of the aluminum front skidplate/bumper and the front and rear torque rods. Wide rear and standard front tires provide more traction than you could handle. 3. Check out the quick-release shock mounts. Remove two body clips, and the shock is in your hand. Pretty sweet. 4. Here's what you get with the 4WD conversion kit. Wow! 5. The rear end features another Equa-Pressure shock and super-wide tires. As you can see, I had to install the receiver on a Lexan shelf; there's just no room in the chassis. The rear aluminum tranny case has another complete set of gears that is provided in the conversion kit. 6. Front universal drive shafts and hardened rear axles were also used on this car.

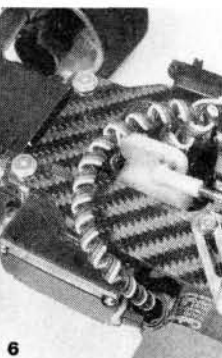
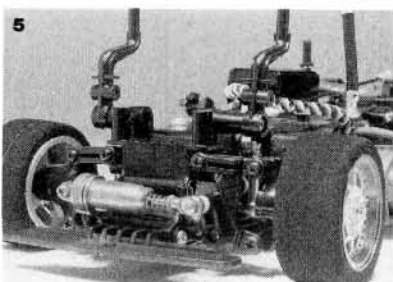
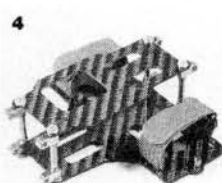
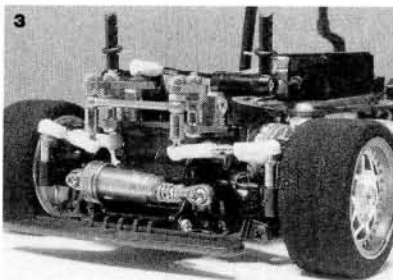
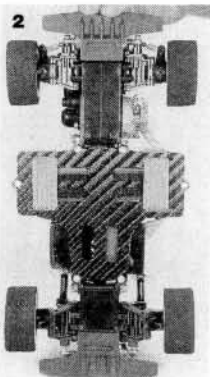
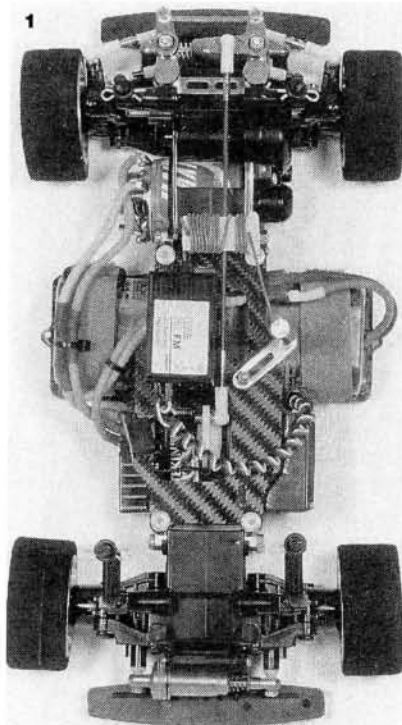
Kose M01

- M carbon-fiber chassis w/upper deck—part no. K-1206
- M-chassis change bones—K-1203
- Two M-chassis aluminum shocks—K-0605
- M-chassis suspension arm spring set—K-1201
- Super aluminum hub set—K-0818
- Super steering and carbon turnbuckle set—K-1202
- Onboard antenna—K-1701
- Body-cushion set—K-0500
- Hardened outdrives—K-1101

Other companies

- Tamiya—M-chassis ball-bearing set—53206
- Manta Ray ball diff—53070
- Tozai* Cyclone racing wheels—TP-32
- High grip foam tires—SE-20
- Celica GT-Four comical racer body—CR-02
- Airtronics Caliber 3P transmitter and FM receiver
- Bolink* Super spring set—BL 5141-A (set of five springs)
- Futaba* 131 high-speed servo
- Maxtec green-can dyno-tuned stock motor
- Tekin G-12c ESC
- Trinity EX-Tech 1700 battery pack

For Kose and Tozai parts, call Japan R/C Imports at (510) 284-5778 for prices and availability.



1. Is this car sweet or what? It isn't any wonder that this one is my favorite. Graphite chassis, graphite turnbuckle steering arm, aluminum steering bellcrank, aluminum oil-filled shocks, foam tires and blue-anodized everything...oh, oh, oh! 2. The flip side shows the flat graphite chassis plate and hook-and-loop-type battery-fastening system. The original plastic suspension arms are retained, and that makes this car very forgiving on bumpy tracks. 3. A better view of the high-tech, bearing-supported bellcrank system. It may be a little pricey, but it's worth every penny and more! Check out the aluminum-body oil-filled shock that's equipped with 40WT oil and a Bolink pan-car spring. Try this setup; it really works. 4. The double-deck chassis is light and extremely rigid. It also places the battery pack farther back and closer to the ground, and that improves weight distribution and lowers the center of gravity. You'll shave several seconds off your best lap times by installing one of these. 5. The rear end is stock except for the aluminum-body shock. Are these the coolest wheels you've ever seen? Foam tires provide outstanding handling and unbelievable speed. They may not be legal, though, at certain races. 6. One of the advantages of the double-deck graphite chassis is that it allows a more conventional servo installation.

1. Is this car sweet or what? It isn't any wonder that this one is my favorite. Graphite chassis, graphite turnbuckle steering arm, aluminum steering bellcrank, aluminum oil-filled shocks, foam tires and blue-anodized everything...oh, oh, oh! 2. The flip side shows the flat graphite chassis plate and hook-and-loop-type battery-fastening system. The original plastic suspension arms are retained, and that makes this car very forgiving on bumpy tracks. 3. A better view of the high-tech, bearing-supported bellcrank system. It may be a little pricey, but it's worth every penny and more! Check out the aluminum-body oil-filled shock that's equipped with 40WT oil and a Bolink pan-car spring. Try this setup; it really works. 4. The double-deck chassis is light and extremely rigid. It also places the battery pack farther back and closer to the ground, and that improves weight distribution and lowers the center of gravity. You'll shave several seconds off your best lap times by installing one of these. 5. The rear end is stock except for the aluminum-body shock. Are these the coolest wheels you've ever seen? Foam tires provide outstanding handling and unbelievable speed. They may not be legal, though, at certain races. 6. One of the advantages of the double-deck graphite chassis is that it allows a more conventional servo installation.

LIKES

- Simply awesome double-deck graphite chassis.
- Incredible speed and handling (best of the bunch).
- The Super Steering kit is the best hop-up for the M-chassis...period!
- Excellent universal swing shafts.
- Stunning blue-anodized hardware.
- Unique Tozai Comical Racer body.
- Tozai chrome and red-anodized wheels are the coolest I've seen.
- Tozai foam tires provide unbelievable handling and speed.

DISLIKES

- None whatsoever!

Make Cheap and Easy Camber Links

I was surprised to find out that when I wrote this, none of the companies mentioned in this article offered adjustable camber links as a hop-up item, and I felt that this was very odd. Camber adjustment is not only an important tuning aid, but it is also a necessary adjustment to promote proper tire wear. Don't fret, though; making adjustable camber links is easy and very inexpensive. Here are all the things you will need to make a complete set (front and rear) for your M-chassis car:

HARDWARE

- Eight ball cups and eight short ball joints from Associated. Their kit—part no. 6271—that has 12 of each is the best deal.
- Four 4-40 machine screws at least a 1/2 inch long.

TOOLS

- Decent-quality wire or bolt cutters.
- A vise or a good set of vise-grip pliers.
- A fine metal shop file (of course, a Dremel* tool would facilitate things considerably).

First, cut the heads off the 4-40 screws and make four identical 1/2-inch rods. Next, file the ends of the rods you just cut so that they're smooth and no burrs or flashing is evident. The next step is to cut a 1/4 inch off four of the nylon ball cups. You'll end up with four long and four short ball cups. You can screw the ball cups onto the 4-40 rods that you prepared earlier. Each rod should have one long and one short ball cup, and keep them the same length to start.

Next, attach the ball joints to the car. Up front, screw two ball joints to the front uprights (caster blocks) and two to the molded upper link mounts. At the rear, screw two ball joints to the rear uprights (axle carriers) and two to the molded upper link mounts.

Then attach the adjustable camber links to the ball joints you just installed. If all is well, you should be able to adjust the camber on all four tires. Start off with about 1 degree of negative camber and adjust as necessary for better handling and proper tire wear.

I hope you'll enjoy using this information as much as I enjoyed collecting it. I have to admit that I was thoroughly impressed with these hopped-up mini land missiles, and they're genuinely fun to drive. You can easily combine parts from the above-mentioned manufacturers, but keep in mind that some of the parts are not compatible. If you are not sure which parts are compatible, talk to your hobby dealer, or call the manufacturers directly. If you totally run out of sources, feel free to e-mail me at georgeg@airage.com.

I plan to give the other editors each a car so that we can do some mini hacking on our parking lot test track, and I may even give one to Chris Chianelli if he ever gets off his high horse and decides to confront reality. Oh well, I'm off to see the wizard as my never-ending quest for hop-up supremacy continues.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

Trick out your ride without breaking the bank!

by Doug Mertes

SO THERE you are, strolling through the hobby shop with \$20 or thereabouts in your pocket, and you're ready to buy. I mean, we're talkin' burning a hole in your pocket here! You don't have to replace broken parts, so we're dealing with totally discretionary income, but you want to ensure that the money you put out is spent wisely. Is there something in the store that will make you faster or make your car or truck easier to repair?—a special part that will get you through turn one faster than your racing buddies, or something that will make that killer paint last a little longer?

Well, read on. The doctor will help you out! I've selected, tested and approved every one of the products listed here. Every single one has been tortured in the underground laboratory, slammed around the track, used and abused—and come up smilin'. None of them costs more than \$20, so you can buy the combination that's right for you, get way ahead of your friends, sleep much better at night, win the race and have change left in your pocket!

40 MODS for

1 Trinity Body Cushions— part no. 6040, \$1.59

These little foam circles are the perfect cushion for your car or truck's Lexan body. They'll prevent it from cracking or fracturing under impact, and they're sticky on one side for easy application.

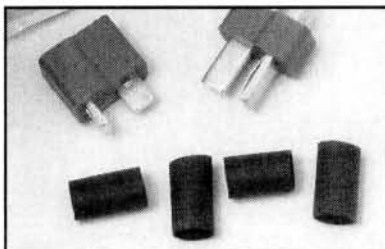


2 BRP Transponder Practice Weight— no. 5350, \$7.50

The pro racer's special secret. Use the included Kydex transponder mount, and run this on your R/C equipment while you practice. That way, the handling won't change when you mount the real transponder when it's race time. Trust me; this one works!

3 Deans Ultra Plug— part DEA-ULT1, \$5.25

Lab tested and proven to produce less resistance than any other plug on the market. If you want the kind of power and voltage you get with hard wiring, but you don't want the hassle of carrying a soldering iron all the time, use these!



4 Rubber tubing— any hobby store, approx. \$1/foot

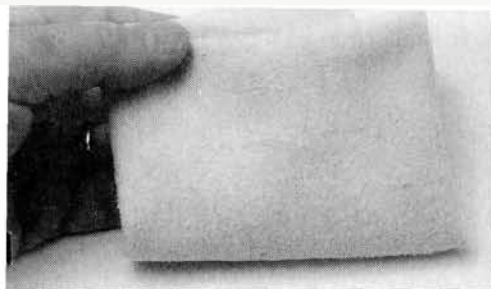
This is available by the foot. I always keep a couple of inches of this in my toolbox and a couple of feet on the workbench. Use it to make shock spacers, to insulate wiring, to protect shafts and for a zillion other things. It usually costs about a buck a foot, and it comes in several colors.



5 Trinity Battery Jig— no. 5002, \$9.99

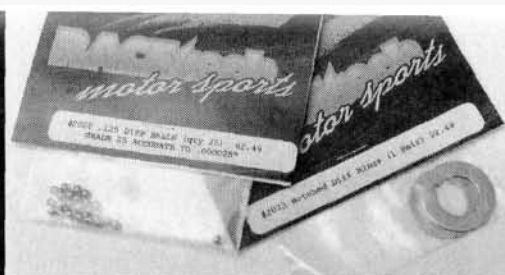
You need something to hold those primo cells while you solder them together, right? Trinity's battery jig fits the 1700 Sanyo SCRC cell, even if it has been shrink-wrapped; disassemble it and store it flat.





6 Track Motor Cooler—most auto-parts stores, \$7

Cut a piece of natural chamois leather into 1½-inch-wide strips, and sew the strips together to make motor-wrap-type coolers. Before you hit the track, drip water onto the wrap; evaporation will keep the motor cool. More than a year ago, I bought a piece, made a couple for myself and gave a bunch away to friends and other club members. I still have enough left to make another 30 coolers!



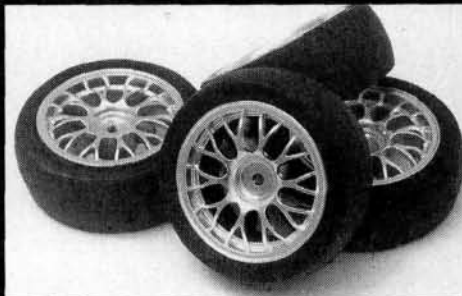
8 HPI Radial Tires and Wheels—nos. 4511 (wide), 5130 (narrow), \$14.50, \$13

Available in various widths and designs, in many parts of the U.S., these are the tires of choice, and when I go to a new track, they're the first tires I run. They're usually still on the car at the end of the A-Main. I've paired them with HPI's awesome three-spoke wheels, but there are a lot of other cool designs, too.



9 Tamiya Super Slicks and wheels—no. 53133, \$20

Available in several widths and designs, these are the tires and rims you need to run in the Tamiya Series—Tammy's best and most versatile; they work on almost every track. The Super Slicks are mounted on Tamiya's chrome-plated Opel Calibra wheel, but there are many other attractive designs to choose from.

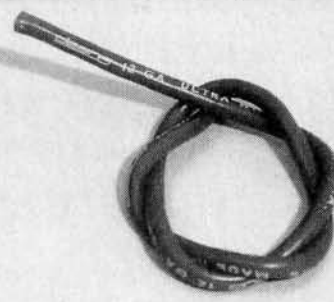


under

20 BUCKS

10 Deans Ultra Wire—nos. DEA 2B (pink/blue), DE 2A (red/black), \$5.95/2 feet of each

It's some of the best wire around, and they even make it in blue for rewiring speed controls. It comes in thick, 12-gauge strands.



11 Bolink Lexan Sheet—no. 2736, \$4.99

Sold as a "Wing and Air Dam Kit" for the dirt-oval set, this Lexan sheet will give you enough flat material to make wings, spoilers, stealth antennas, and many other items for a couple of years.

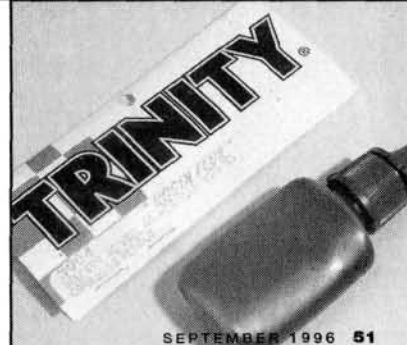
12 Motor Man Motor Holder and Fan—no. 1361, \$7.99

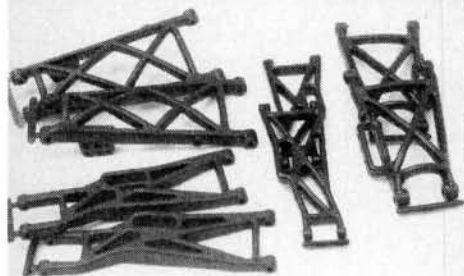
You need something to prevent your motor from rolling around while you solder the capacitors on it, right? This holder does that job admirably, and it comes with a small plastic fan blade that you slide onto the motor shaft to keep the motor cool while you break in your brushes.



13 Trinity Solder Flux—no. 5004, \$4.99

My secret to super soldering! I don't go to the track without my solder flux; it keeps joints shiny, flexible and capable of carrying heavy amp loads.

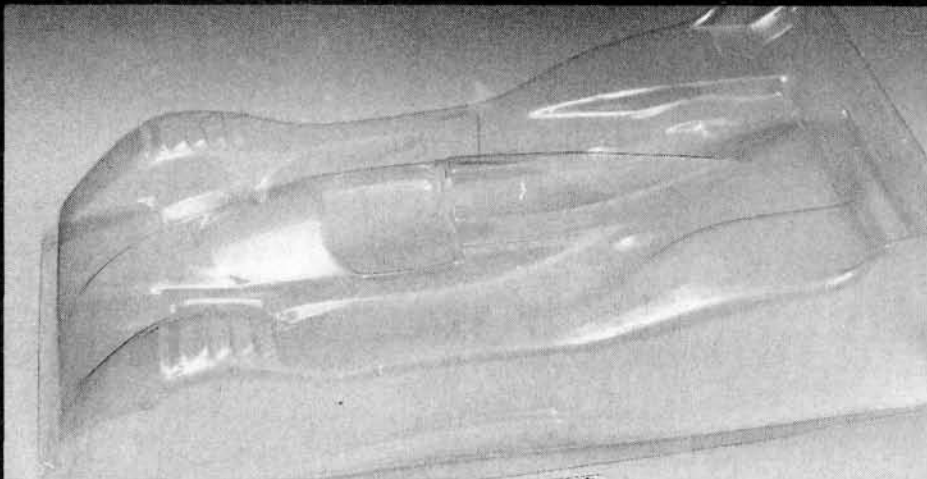




14 Team Losi Graphite Suspension Parts for the Double-X and Double-XT—

various nos., \$10 to \$13 each

If you run on rough tracks, these suspension arms and shock towers will help you survive the rough-and-tumble world of off-road!



15 BBR Ferrari 333SP body—no. 333SP, \$12.95

This has to be my favorite 1/12-scale body—neutral handling and very durable. If I can't break it, neither will you!

16 Trinity SS Body Mounts—no. 6041, \$12.99

Simply the smoothest, neatest, cleanest way to mount an oval body. Ugly body clips are kept out of the wind, and that makes you faster on the straights. Plus, the clips won't come off in a crash.



17 Tower Hobbies Parts Boxes—no. KS0502, \$2 with order

Use these handy boxes to keep screws, nuts and other small parts organized so you can find them when you need them—two bucks a pair when you place an order.

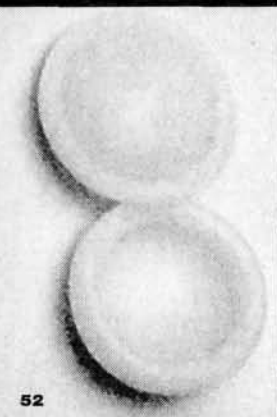


18 Kose M-chassis Spring Set—no. K1201, \$17

If you want to make your M-chassis car drive as if it's on rails, consider these suspension-arm springs a must. They'll greatly reduce body roll, and that translates into lower lap times. Every kit contains springs in three different tensions.

19 Radio Shack Cooling Fan—no. 273-241C, \$17

If this fan looks a little beat up, it's because it has been thoroughly field tested. I use it to keep my power supply cool and to reduce the temperature of my car or truck motor when I come off the track.



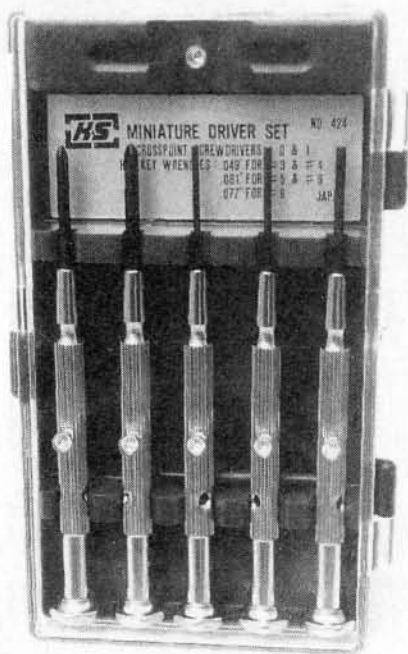
20 HPI Shock Bladders—no. 6814, \$2

If you want a smooth, consistent ride, you must keep air out of your shock oil. These bladders fit almost any shock body, and they do the job very, very well. I use them in Associated hard-anodized shocks to keep my ride shiny side up!

21 TRC Foam Front Bumper—no. 214, \$3.50

This is the cheapest way to prevent the front of your speedway oval car from collapsing, especially if it's a lightweight car without a front bumper.





22 K&S Miniature Driver Set—no. 424, \$19.95

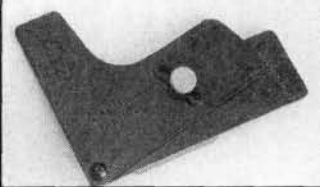
Miniature tools for tiny parts; jewelers' screwdrivers and hex drivers to take care of all your needs. The handle has a little cup to apply pressure while you spin the shaft with your fingers.



26 Associated Blue-Anodized Light-weight Screw Set—no. 8115, \$8.50

Made by the company that makes the original kit, these lightweight, anodized, hardened-aluminum screw sets fit Associated cars and trucks; they're blue, too!

28 RPM Precision Camber Gauge—no. 7099, \$9.95



This hot little molded-plastic camber gauge should be in everyone's pit box. It allows you to measure your on-road or off-road car's camber easily and accurately—accurate to within 1 degree.

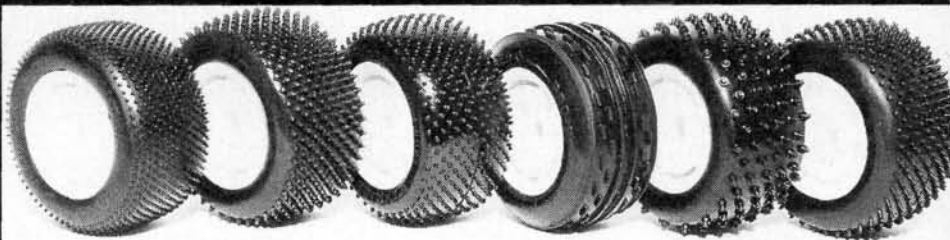
23 BRP Wings and Wing Wire—no. 5246 (wire), 5238-40-41 (wings), \$4.95 to \$9.95

BRP's Bud Bartos is known as "the king of the wings" for good reason: his wings and wing wire are among the best. This wire set is bent (great for those of us who have trouble bending it properly); if you're into oval racing, mount the wing on the roof of your stock car.



24 Trinity Motor Spacer—no. 4043, \$7.99

Slip this grooved motor spacer between the motor and mounting plate in your car or truck, and you'll find that the motor runs much cooler. It's purple-anodized, too!



25 Pro-Line Off Road Tires—various nos.; \$8.95 to \$17.95

You can't do any better than winning the world championship, and Pro-Line has done it more than once! Their truck and buggy tires have all the latest rubber blends and tread styles to get you to the finish line first.



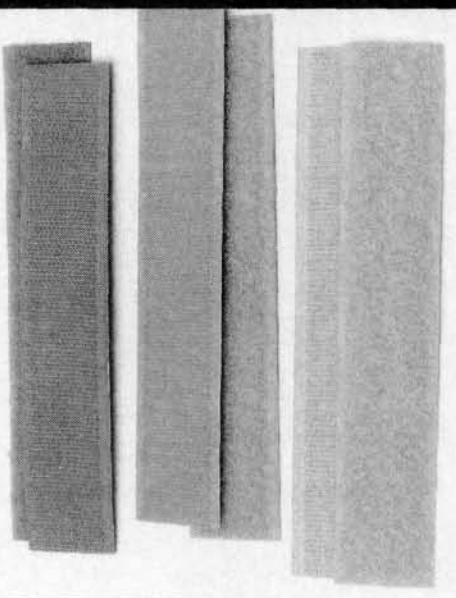
27 Tamiya Fiber Axle for F1 Cars—no. 53091, \$12.90

This is the best way to take weight off your Tamiya F1 car. Use it and remove almost 1½ ounces of rotating weight from 101, 102 and 103 series chassis designs.



29 HPI Ferrari F1 Body—no. 7030, \$20

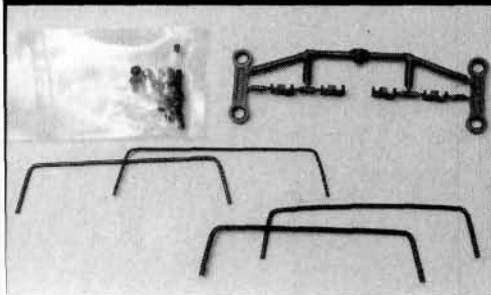
Probably the most versatile F1 body on the planet, this works with virtually any chassis and almost any bumper/wing combination, and if you mount the nose behind the front tip of the bumper, it will last a long time.



30 Race Prep Colored Velcro®-brand Fastener—RP1050, \$2.50

Now you can get self-sticking Velcro® to match your paint scheme! You get enough to install receivers and speed controls in a dozen cars, or use it to keep your buggy body securely attached.

40 MODS FOR UNDER 20 BUCKS



31 Team Losi Double-X Sway-Bar Kit— no. A4140, \$9.95

This setup allows the off-road tuner to reduce front or rear traction on high-bite tracks. It can also be adapted to fit many other on-road and off-road cars and trucks.

32

Robinson Racing Bearing Cleaner— no. RRP-

2047, \$14.95

Place a bearing inside the case, insert the motor-spray nozzle and pressurize with motor cleaner.

Your bearings will come out squeaky clean, and your car will run faster and longer!



33 Trinity Purple Lightweight Screw Kit—no. EVO-139, \$18.99

Use a set of lightweight screws, and your vehicle will lose an ounce or two. This set fits Associated off-road trucks, but Trinity sells lightweight hardware for most of the popular on- and off-road vehicles.



34 Racer's Choice Traction Compound— no. 7018, \$10.95

I prefer TQ8+ traction compound, because it doesn't smell as bad as many of the others available, yet it still gives me good traction, indoors or out, even for those long 8- and 10-minute Mains. Preferred by racers with sensitive sinus cavities!



35 Peak Performance Tom's Tool— nos. PP3001 (Associated), PP3002 (Losi), \$15

A doc's "must have"; this wild little tool is great. Use it to pop off ball cups without hassle and to hold a ball cup still while you thread a turn-buckle into it!



36 Paragon Liquid Bearings and Ultralon— no. LB025, UL035, \$3.95 each

These are the ultimate dry lubricants. Use them on gears, bearings, sliding parts and bronze bushings; they won't attract dirt or dust.

37 Racer's Edge Commutator Cleaners— no. 120, \$4.95

Available for both upright and laydown brush hoods, in several degrees of abrasion. This green one is used to polish a clean commutator. Keeping your comm clean and shiny is the fastest way to the winners' circle!



38 Cobra Racing Hot Rods—C1006, \$5

If you absolutely have to use Tamiya connector plugs, these gold-plated beauties are the best you can buy. Upgrade your current connectors using your existing housings, and get more voltage to your car's innards.

39 Trinity Buggy Grip— no. TK2000, \$7.99

Want a little more traction from your off-road tires? Check out Trinity's Buggy Grip. It softens natural-rubber tires made by Team Losi and Pro-Line, and it might also work well on touring-car tires. The result? More traction!



40 Track time

No matter how fast you are or how well you drive, you can always benefit from additional track time. Take time out to spend a day tuning your car or truck and practicing with it, and I guarantee that you'll be faster on race day!

The addresses of the companies featured here are listed alphabetically in the Index of Manufacturers on page 176.

SPECIFICATIONS

SCALE 1/12
LIST PRICE \$323

DIMENSIONS

Length overall 15.6 in.
Wheelbase 11.2 in.
Width (F/R) 8.1 in.

WEIGHT (gross) 3 lb., 1.6 oz.

CHASSIS Molded-plastic tub

DRIVE TRAIN

Type Shaft-driven 4WD
Primary Spur/pinion
Transmission Dogbone/axle
Differential (F/R) Gear/adjustable ball
Slipper clutch None
Bearings/bushings Plastic and metal bushings

SUSPENSION (F/R)

Type 4-wheel, independent wishbone
Damping Oil-filled, coil-over plastic shocks

WHEELS (F/R)

Type One-piece plastic rim
Dimensions (DxW) 2x1 in.

TIRES (F/R) Semipneumatic rubber

ELECTRONICS

Speed control 3-step mechanical
Motor 540 stock
Battery Not included

TAMIYA M1025 Hummer

by Greg Vogel

THE DICTIONARY definition of the word "realistic" reads: "(adj.) an accurate representation without idealization." Now, if there were an R/C dictionary, this would be the definition of the word: "realistic (car)—Tamiya M1025 Hummer. See also cool, fast and fun." Tamiya* has introduced a perfect, 1/12-scale replica of the popular, 4WD, high-performance, off-road Hummer—a military vehicle. You might think that it's small, but it isn't; it's larger than Tamiya's 1/10-scale stadium trucks. Remember: it's 1/12 scale of the full-size Hummer.

KIT FEATURES

The M1025 Hummer is very easy to assemble. All parts are easy to find and to match to the pictures in the instructions. The rugged TA01 chassis is the base of this awesome vehicle. A lengthened wheelbase and longer suspension arms keep it on track. Unlike its TA01 relatives, all the parts are molded of black plastic, but it has the same rugged, bathtub-type frame and smooth front gear diff and rear ball diff.

Oil-filled, coil-over plastic shocks control the front and rear double-wishbone suspension. These shocks do not have interchangeable pistons; the

metal piston and shock shaft are machined as one piece. Clamping collars make the spring tension adjustable.

Included with the Hummer is a powerful 540 electric motor that is mounted on a plastic motor mount with numbers that correspond to the appropriate pinion gear. This makes it easy to install the motor without having to worry about adjusting the gear mesh perfectly.

The 3-step mechanical speed control is in a separate bag that also contains installation instructions. One of the first things you should do is place these instructions on the corresponding page of the manual. I built the vehicle, then went to install the speed control. To my dismay, I had to disassemble part of the Hummer to install it.

Changing the battery is fairly easy; remove the two body clips, raise the rear of the body, remove the battery-holder clip, and slide the battery out through the side.

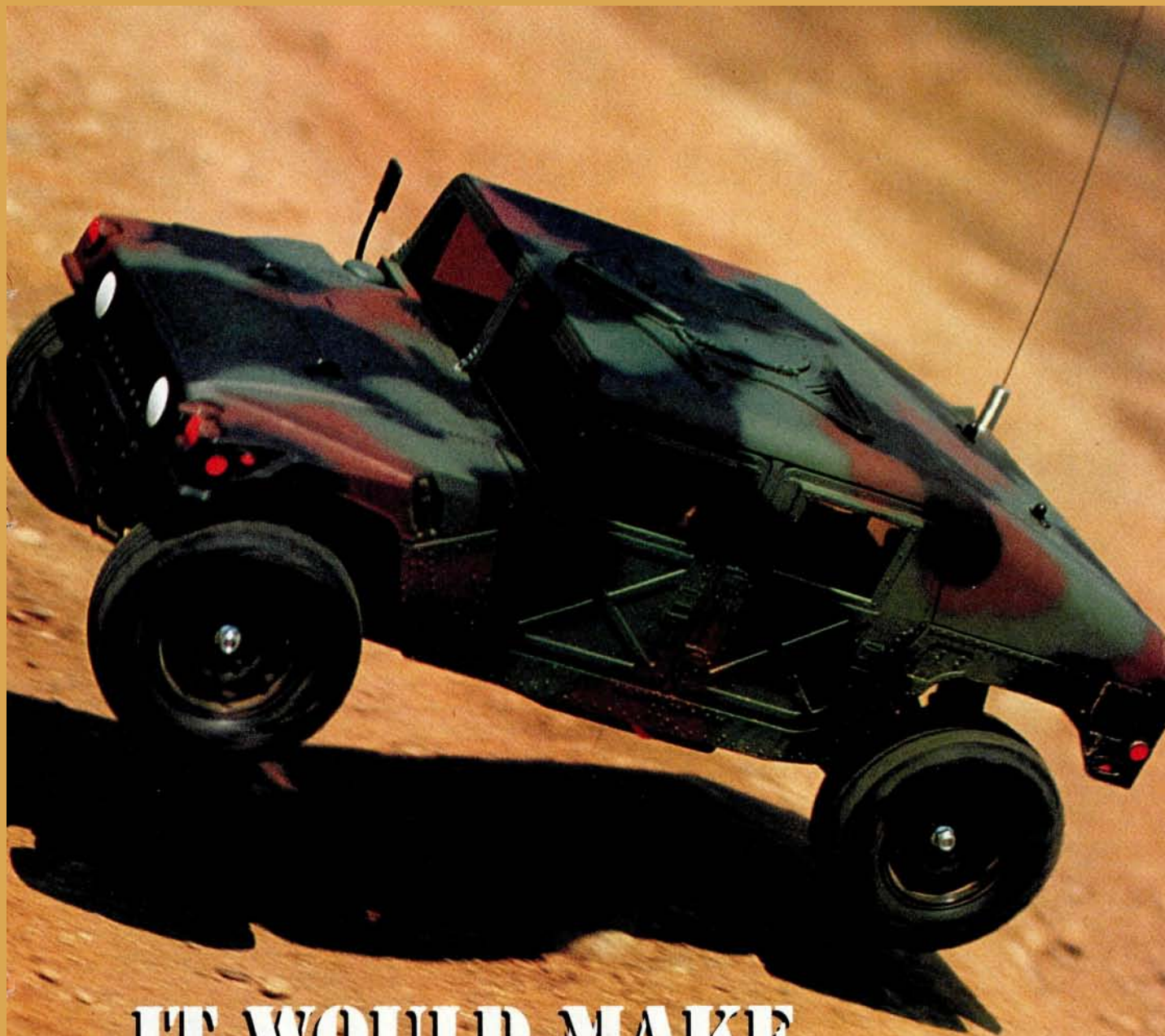
On each corner of the Hummer is a large, treaded, semipneumatic rubber tire with a realistic, military, one-piece dish rim. The injection-molded, two-piece, styrene body is absolute perfection—exactly like the real thing; you can count every rivet, and there is even a separate turret on the top. The back is sloped, and the side



Building & Setup Tips

• Carefully read the instructions before you start to build. If you plan to use the 3-step speed control, install it when the instructions say you should, or you'll face the same problems as I did.

• The instructions recommend that you grease the drive shafts and propeller shaft. Apply the grease sparingly. The more grease you apply, the more dirt the parts will attract, and the faster they will wear out.



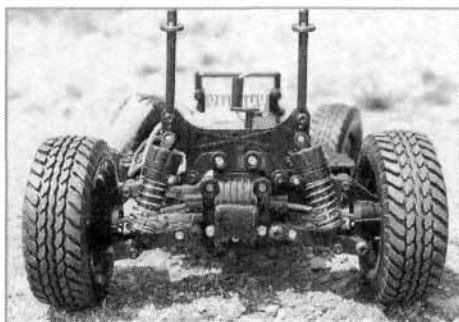
IT WOULD MAKE G.I. JOE PROUD

• I do not like to strip the antenna wire to attach it to the metal antenna because a stripped end can fray, and that makes it difficult to use it in another vehicle. Why not pick up an antenna tube at your local hobby store? Part no. E6 in the Hummer kit is a mount for the antenna tube. Feed the antenna through the tube, and install it on the mount. Then drill an antenna hole in the body. You sacrifice realism, but you won't have

to cut the wire, and it will be easier to remove the body.

• To achieve a realistic camouflage paint job, an airbrush is recommended. Don't be upset if you don't own an airbrush; you can achieve an equally presentable finish with a paintbrush and time.

PHOTOS BY JOHN HOWELL



Above: the rear features oil-filled plastic shocks. The small rear hatch allows you to easily access the rear differential.



Above: the Tamiya M1025 Hummer is based on the company's popular TA01 chassis. The kit includes a 3-step mechanical speed control and a 540 motor. **Left:** the front-end bumper is big enough to take the impact of most of the obstacles thrown its way. Plastic, oil-filled shocks soak up any enemies you might happen to run over.



LIKES

- Highly detailed M1025 Hummer body.
- Excellent 4WD train.
- Rugged chassis design.
- Easy to build.



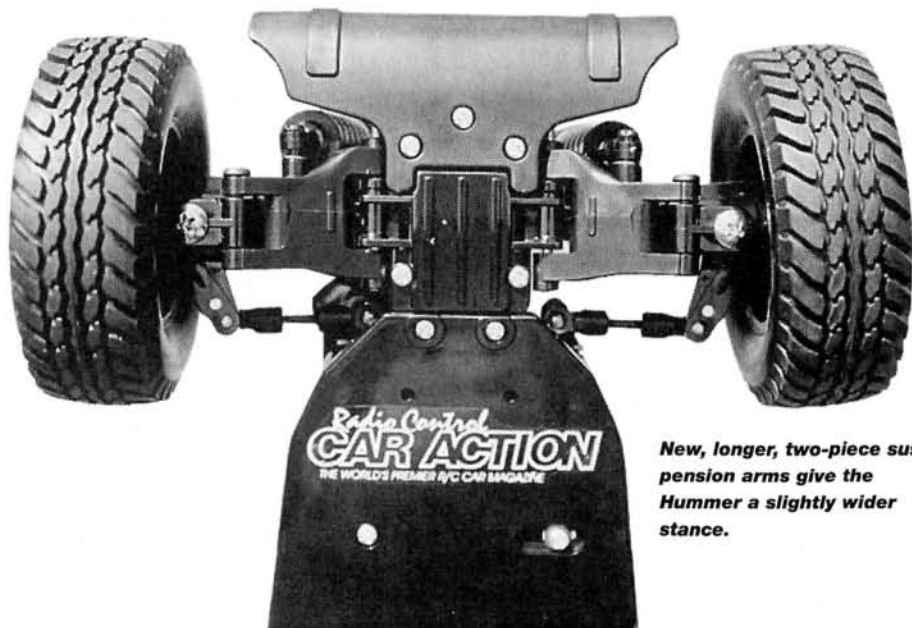
DISLIKES

- Antenna wire is attached to the body.
- Body is hard to remove.
- Suspension components have some play.

mirrors have rubber O-rings to absorb shock and prevent them from breaking. Underneath the front of the body are plastic clips that you attach to the front shock tower so the body mounts won't show. A metal whip antenna adds to the realism. The wire from the receiver is wrapped around an eyelet on the antenna; when you take off the body, it will still be attached by the antenna wire.

When you paint the body, remember to use regular model paints. Tamiya offers a wide range of these paints to choose from; the kit's instructions tell you which colors to use. To paint the camouflage pattern, an airbrush is recom-

mended. The editors of *R/C Car Action* were kind enough to supply me with a Hummer body that had been professionally airbrushed by Scot Bich of Bich 'n Bodies*. Pretty stunning, huh? In fact, I'm tempted to shelve this puppy and pick up another body for general thrashing; it's that nice!



New, longer, two-piece suspension arms give the Hummer a slightly wider stance.

THINGS YOU'LL NEED

- 2-channel radio system.
- Cutters and modeling knife.
- Battery charger.
- Phillips screwdrivers (large and medium).
- Model paint.
- Long-nose pliers.
- Battery pack.
- Instant glue.



Factory Options

- Ball-bearing kit—part no. 53073.
- Stainless-steel propeller-shaft set—53079.
- Torque-splitter set—53071.
- RS-540 sport-tuned motor—53068.

TAMIYA M1025 HUMMER

TEST GEAR

I used a Futaba* Magnum Sport radio with a receiver, and to control the steering and the mechanical speed control, I used two S148 servos. A Trinity* Zip Pack provided the juice.

PERFORMANCE

After I had built this impressive military machine, I was eager to test it, so I charged up the battery and was ready for my backyard. But as I opened the door, I heard rain pelt the ground—rats! All pumped up, I *had* to drive it. I headed for the living room. On the hardwood floors, the car was awesome; it was quick, and it did neat spins when I threw it into reverse. Caution: I do not recommend that you try this in your home! I spent the rest of that rainy afternoon scrubbing rubber tire marks off the floor.

The next day was sunny, so with another charged battery, I set out on a backyard mission. Just as I expected, the Hummer handled incredibly well. I have driven some of Tamiya's stadium trucks, and I can say that, with its lengthened wheelbase and longer suspension arms, the Hummer handles much better. Still, it isn't a stadium truck, so the larger bumps tossed it around. During the rest of the testing, I stuck to less bumpy ground,



Realistic-looking tires and wheels help the Hummer get through gnarly backyard "covert missions."

and I had a blast. The 3-step mechanical speed control provided smooth response, and the stock 540-type motor was pretty powerful.

FINAL THOUGHTS

Tamiya is obviously a leader in scale realism. The M1025 Hummer is perfectly detailed with a durable, four-wheel-drive chassis underneath. The people at Tamiya definitely deserve a salute for their efforts in producing this popular military car. With the Tamiya M1025 Hummer, you can "be all that you can be" as an R/C driver!

**Addresses are listed alphabetically in the Index of Manufacturers on page 176.*

ADVERTISEMENT

TEAM LOSI TECH TALK

SUSPENSION UPDATE

With the release of the new Double-X 'CR', Team Losi hasn't forgotten about all the racers who already have Double-X cars. There is a 'CR' suspension update kit available for existing Double-X cars. This kit includes new rear suspension arms, new rear pivot support/block assembly, rear hubs and spacers. The 'CR' suspension update kit (part no. A-0902) is currently available for a suggested price of \$24.95.

If you plan to update your existing Double-X with the 'CR' suspension kit, it is highly recommended that any worn-out parts on your Double-X be replaced at the same time. If these new 'CR' parts are used with worn-out or damaged parts, the full benefit of the new 'CR' parts will not be realized.

DIAMOND IN THE ROUGH

Team Losi has just added a new front tire to their ever-popular line of race-proven tires. The diamond-pattern front tire is ideal for blue-groove conditions. This new tire also works well on asphalt, carpet, artificial turf and concrete surfaces. The diamond front tire features a series of diagonal cutouts across the carcass that form diamond-shaped patches on the tire surface. Early testing shows that this tire is destined to be another winner. The diamond-pattern front tire is available in Gold (A-7203G) and Silver (A-7203S) compounds, and both come with foam inner liners.

KEEP IT SLIPPIN' SMOOTH

The slipper plays a very important part in the handling of your car or truck. To ensure that it operates properly, you should have it serviced or checked occasionally. The two parts of the slipper that you should be concerned with are the backplate and the slipper pad. After several runs, the slipper pad will be worn down and become dirty or "galled." The worn material can accumulate on the backplate. To service the slipper, scrub the backplate with a Scotch-Brite™ pad or crocus cloth to remove any build-up. The slipper pad should then be either scraped with the edge of a hobby knife or simply flipped over so that the opposite side can be used. If the slipper pad's shape is distorted at all, it should be replaced. A freshly rebuilt slipper can greatly improve the handling of your vehicle.

Let us know what's going on! Address your questions and problems to Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

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KYOSHO TF-2

by Doug Mertes

THERE'S A LOT to choose from in the 4WD touring car class these days. You can go for heavy realism and buy one of Tamiya's* many excellent kits, or you can opt for a more performance-oriented racer from such companies as HPI*, Schumacher*, Tenth Technology* and Yokomo*. If you plan to race and your local parking lot series doesn't limit racers to Tamiya chassis, racers from the aforementioned companies probably fill the top spots. So if you're into racing, which one should you pick? With all that's available, it's hard to choose. Well people, I'm here to tell you that there's another new racing chassis on the block, and it may make your decision even harder!

KIT FEATURES

Kyosho* introduced its Pure Ten series last year; they were hobby-quality kits that came with a body, metal bushings instead of bearings and an aluminum chassis plate. They're great for enthusiasts who want something a little different from the Tamiya kits but still prefer realistic body styles, slower speeds and fewer tuning adjustments. Now, with the introduction of the TF-2, Kyosho has given us a true racing enthusiast's rolling chassis kit with a full set of ball bearings, graphite chassis plate, superior-quality aluminum body shocks, turnbuckle upper suspension links and adjustable caster options that allow the knowledgeable owner to set it up for virtually any racing surface.

SPECIFICATIONS

SCALE Pure Ten
LIST PRICE \$199.99

DIMENSIONS

Length overall 15 in.
Wheelbase 10.3 in.
Width (F/R) 7.9 in.

WEIGHT (gross, RTR) 52 oz.

CHASSIS

Type Double deck
Material Graphite lower plate,
aluminum upper plate

DRIVE TRAIN

Type Belt drive
(2.2:1 reduction)

Primary Pinion/spur
Transmission Dogbones/axles
Differential Gear diffs
front and rear
Slipper clutch None
Bearings/bushings Bearings

SUSPENSION (F/R)

Type A-arm with
adjustable upper link
Damping Oil-filled
coil-over shocks

WHEELS (F/R)

Type Nylon, hex drive
Dimension (DxW) 2x1 in.

TIRES (F/R) Soft-compound foam

PHOTOS BY DOUG MERTES

Building & Setup Tips



dry paper under a thin stream of running water and then sealed all the edges with Zap* CA after I had dried them. This reduces the possibility of graphite splinters

going into your fingers. Ouch!

- I cut the plastic parts off the parts tree with a pair of side cutters and then carefully removed any final flashing left over after the molding process with a sharp knife blade. This is an important step, especially for shock-absorber and suspension parts.

- I also sanded the edges of all the graphite parts with no. 400 wet and

- I was concerned about the front bumper and its relationship to the gorgeous Kyosho Pure Ten Skyline GTR touring car body I painted up. The front of the body didn't seem very rigid, and I didn't want it to tap on the pavement or catch on a crack in the parking lot. That body took a long time to mask and paint! I

installed one of TD's* worthwhile Protectors to support the front end; these are very easy to cut and sand to size. I wouldn't run a parking lot car without one!

- I was unable to set up the Kyosho for the carpet track, but I'd give it another try if the lanes were a little wider. That I was using an Andy's* Dodge Viper body (which is also wide and very long) didn't make things any easier. To properly balance traction, I'd use harder compound foam donuts on both ends, and I'd install the optional ball differential out back and the front and rear swaybars.

- On asphalt, it was an entirely different story. Using my baseline setup discussed in the article, I found that the TF-2 was pretty fast as soon as I put it down on the pavement. Kyosho includes three shock-piston sets. Add the optional shock springs that come in soft to hard weights and an assortment of shock fluid in the 20WT to 80WT range, and you should be able to set the car up for any parking lot you might encounter. The car's slightly wider track makes it very stable under power and through the turns.

Touring car de force

• **Parts.** Kyosho has done its usual superior job of combining parts organization and a terrific instruction manual. All the parts that are used in each step come in a separate bag, except for the screws and small metal parts, which are in their own smaller bags. I cut the screw bags open and dumped the contents into small margarine containers so that I'd be able to find the nuts and bolts I needed for each step more easily. You'll have to supply the usual screwdrivers, wrenches, pliers and hobby knife, but you'll be able to put the kit together very easily in a couple of hours.

• **Assembly.** The building process is very straightforward. It begins with assembly of the front and rear gear differentials (gear diffs? on a race-car?) and proceeds through their installation in the open-architecture bulkheads. Light, aluminum shock towers adorn each end of the car, and a full set of turnbuckles gives the tuner total camber/toe-in

adjustability. The kit uses dogbones and drive axles instead of one-piece drive shafts, but all the axles and diffs are supported in high-quality ball bearings.

• **Shocks.** The TF-2's shocks have machined-aluminum bodies and purple-anodized aluminum caps. An internal diaphragm prevents air from mixing with the oil, and a selection of shock pistons allows you to tune

gearing. A 104- or 108-tooth spur would work as well.

• I usually start by getting the rear end to stick by choosing the correct springs and oil, and then I balance the steering by adjusting the front suspension's firmness. I almost always run really thick oil up front; it "deadens" the steering response on the somewhat slippery tracks we tend to have in the Northeast. If I was running on a really nice, clean, treated track, I'd be tempted to try some of the new, narrow radial tires that have recently hit the market.

• On a clean, asphalt lot on a warm, sunny day, I used a set of Tamiya Super Slick tires mounted on chrome-plated Calibra wheels, but I'd switch to treaded radial HPI tires if the day was a little cooler or if the surface was dirty. HPI slicks would probably work pretty well, too. Unlike my experience with Yokomo and Tamiya cars, I didn't find the car very sensitive to tire changes.

• I replaced the 86-tooth, 48-pitch spur gear with a Kimbrough* 116-tooth, 64-pitch spur; this makes it a little easier to find the proper



The new Kyosho Spider TF-2 is a very competent 4WD contender.



I installed a TD protector to support the front of the Skyline body and prevent it from touching the asphalt.

• Body selection has a big effect on steering and handling. A blunt-nose body will usually give you a little less steering at speed, which is fine with me. For more high-speed steering, I'd use something like a Mercedes body, which tends to be more sloped in front than a Supra, Skyline, or BMW.

• I generally set a car up with a degree or so of negative camber and then adjust it according to tire wear and traction. RPM's* inexpensive camber measuring gauge is good for this. If you see wear patterns on the inside or outside of

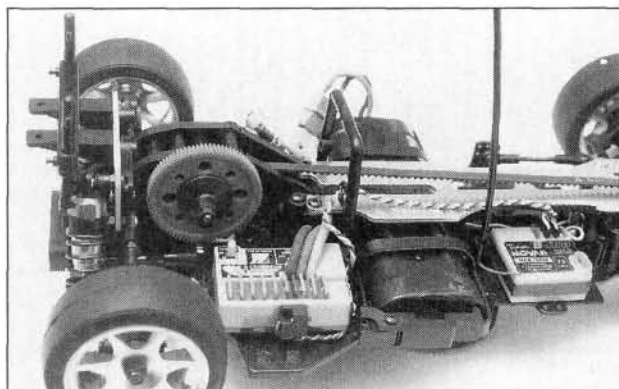
the tire tread, consider altering the camber settings to give the tire a larger contact patch or vary the mounting positions of the front-suspension-pin braces; this will allow you to change the front and rear caster quickly and easily. More caster will give you additional entry speed steering and less exit steering under power, which most drivers prefer.

shock action to your racing surface. I set mine up with 80WT oil with one-hole pistons up front and 20WT oil with two-hole pistons out back. This gave me the combination of rear traction and reduced steering action that best fits my driving style. The kit comes with a set of white rims and foam donuts better suited to carpet than to pavement; rubber tires will last a lot longer than foams on concrete or asphalt.

TEST GEAR

I believe in installing electronics that are at the same level as the car: the faster and more serious the car, the better the gizmos should be. With the TF-2, that meant starting with one of Novak's* neat new Tempest speed controls. It's packaged so that the wires come out of the top of the case for an easier fit on a tight chassis, and it's rectangular instead of square. The Tempest also has an updated electronic design that ensures super-low resistance and maintains steering control even when the batteries

The open-style bulk-head design means that small stones won't get lodged between the belt and the chassis.



Things are really tight around the motor mount plate. You have to pull the pins and move the ESC to change the motor. Note the neat battery holder.

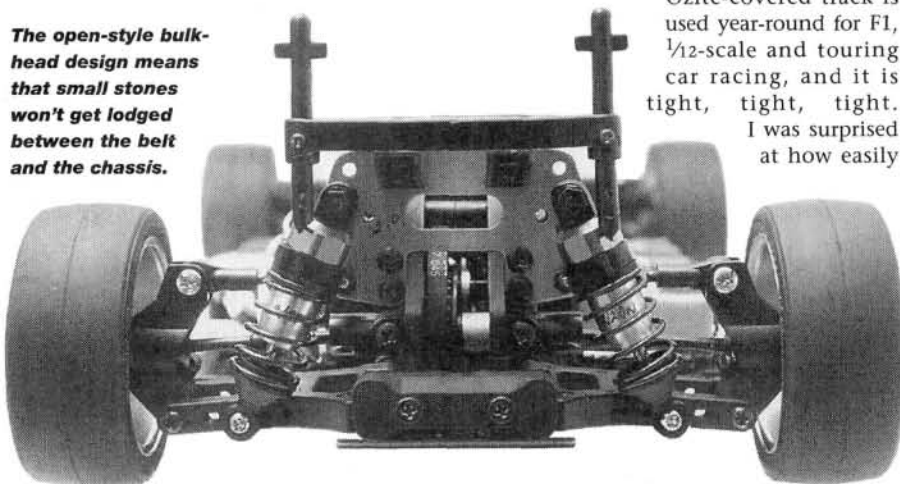
are too far gone to motivate the car. This makes for a totally smooth ride.

One of Novak's pro-level NER-3FM receivers works with my JR* 756 FM transmitter for flawless, locked-in control to the ESC and the Futaba* S132H steering servo. Any stick-type or side-by-side-style battery pack will fit, although you'll have to "encourage" a non stick-pack to slide through the unique, lightweight battery holder.

PERFORMANCE

I raced the Spider TF-2 on two tracks. My first test was on the narrow infield course at The Track in Gaithersburg, MD. This Ozite-covered track is used year-round for F1, 1/12-scale and touring car racing, and it is tight, tight, tight.

I was surprised at how easily



THINGS YOU'LL NEED

- 2-channel AM or FM radio transmitter and receiver.
- Steering servo. The servo-mounting hardware will accommodate a case of any size.
- Motor.
- Battery pack; you can use either stick or side-by-side style.
- Lexan body. Measure carefully; this chassis is too wide for most bodies. Kyosho bodies are lovely and fit perfectly (you can get optional dogbones and upper links to narrow the chassis).
- Rubber tires and wheels if you intend to run on asphalt; any standard hex-drive-type wheel fits just fine.



Factory Options

- Electronic speed control.
- Belt support bearings.
- Front and rear swaybars.
- Lightweight carbon-fiber front and rear shock towers.
- One-way front diff.
- Front and rear ball differentials.
- Carbon-fiber upper deck.
- Shock-spring set (soft to hard).
- 2-speed transmission.

the narrower cars negotiated the 4- or 5-foot-wide lanes; the wider Kyosho was a real handful! I spent hours trying to get the car to behave, but to no avail. Different shock oil weights, springs, pistons, camber settings and ride heights made the car only slightly less difficult to drive. By the end of the evening, I had to be satisfied with winning the B-Main. Later bench-racing sessions made me think that the foams that came with the kit were incompatible with the carpet; they became greasy and slid too easily after a lap or two when the tires started to heat

up. Next time, I'll try purple foams out back and reds up front, like the rest of the fast guys.

On the pavement, however, it was a different story. Here, the extra inch of width that the TF-2 has over most other 4WD touring cars gave it extra stability through the turns and over the bumps. It had just enough steering to avoid trouble, but not so much that I couldn't

THE COMPETITION

	Kyosho TF-2	Tamiya TA02 RS	HPI RS-4	Yokomo YR-4M	Tenth Technology Predator DTM
Wheelbase	10.3 in.	10.5 in.	10 in.	10.32 in.	10 in.
Width (F/R)	8 in./8 in.	7 in./7.2 in.	8.65 in./9 in.	6.5 in./6.25 in.	7 in./7.25 in.
Weight	3 lb., 4 oz.	3 lb., 5 oz.	3 lb., 5 oz.	2 lb., 12 oz.	3 lb., 5 oz.
Diff. type (F/R)	Gear/Gear	Ball/Gear	Ball/Ball	Ball/Ball	Ball/Ball
Chassis	Graphite/alum.	Plastic	Black fiberglass	Graphite	Resin composite
Price	\$259.99	\$320	\$298	\$425	\$479
Available at*	\$199	\$169.95	\$199.99	\$319.95	\$320
Issue reviewed	9/96	—	5/96	9/96	7/96

*Prices vary with location.

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KYOSHO TF-2



LIKES

- Pro-level suspension design.
- Efficient belt drive with open bulkheads.
- Super handling.



DISLIKES

- Ball diffs aren't standard equipment.
- ESC is mounted on a small plate and must be removed to change the motor.
- Bodies that fit (other than Kyosho's) may be tough to find.

toss it around and through the corner traffic. Slicing and dicing around the track, the TF-2 really came into its own. Unlike my Yokomo YR-4, it never tried to swap ends under braking, yet it kept significant momentum through the turns in a controlled four-wheel drift. The TD protector prevented the body's front lip from scraping the pavement, even though there wasn't a lot of ride height, and the Pro-Line* Sedan Hawgs were the perfect tires for the swept but untreated asphalt surface. Cool!

FINAL THOUGHTS

Before you decide which 4WD touring car to buy, check out the rules for the series in which you intend to participate. If it has a touring-car-chassis racing class, you should take a serious look at the Kyosho Spider TF-2. I found the car remarkably durable during testing (I actually destroyed a body in one evening on the carpet). Nothing fell off or prevented me from finishing a race. I would be willing to take this car to a regional or national race; I find it very comfortable and reassuring to drive at high speeds with a modified motor. I have no doubt that I'll be able to win my share of local parking lot races with it. Although it doesn't require a bunch of aftermarket parts to make it competitive, I intend to install a one-way diff up front and a ball diff in the rear. I'll experiment with front and rear swaybars and maybe some other stuff to cut an ounce or two off the car's weight (I'll do an update article on these mods in the future). But as it comes out of the box, this car is a winner.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

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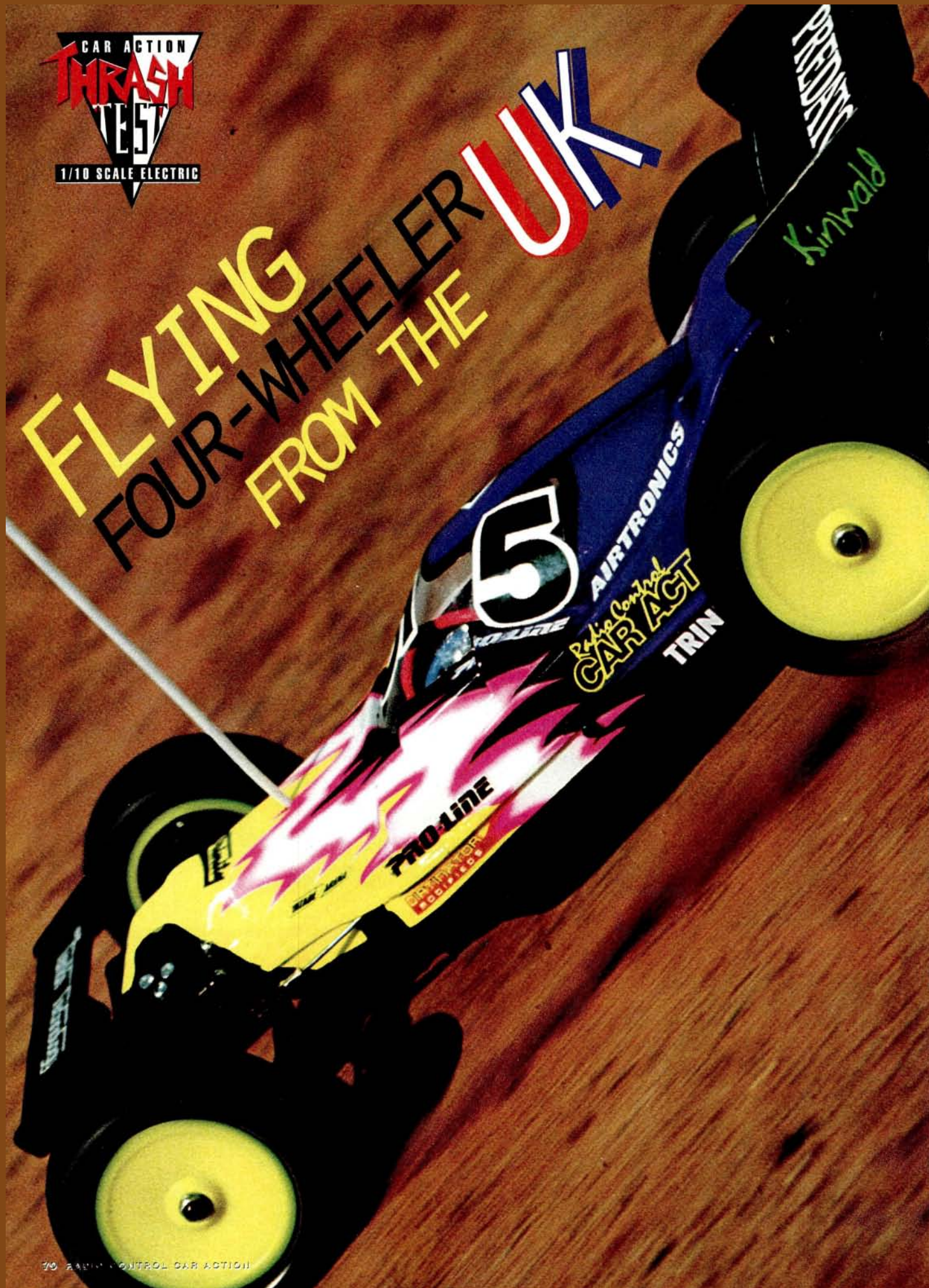
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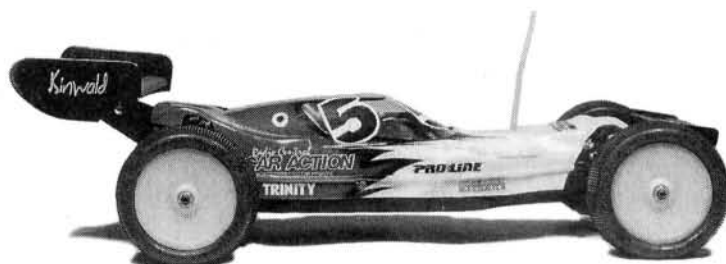


FLYING FOUR-WHEELER FROM THE UK



TENTH TECHNOLOGY Predator

by Frank Masi



I FIRST LEARNED about the Tenth Technology* Predator during the '94 Florida Winter Champs off-road race. I was told about a new 4WD buggy that was "totally different" from conventional buggies (such as the Yokomo YZ-10 and Kyosho Lazer) in that it used a center-mounted, carbon-fiber drive shaft, had a motor that was placed in line with the chassis' centerline, used radical, F1-type inboard shocks and had a unique front wing as well as a rather large rear one.

The Predators that ran in '94 failed to make a lasting impression on the U.S. racing community; two years later, however, at the '96 Winter Champs, Team Trinity/Losi's Brian Kinwald showed everyone that the Predator was far more than an interesting design when he beat not only an international field of the best 4WD racers, but also current IFMAR 4WD world champion, Mark Pavidis.

I was heading to Arizona to cover the Pro-Line/Car Action Cactus Classic (see coverage in this issue), and I thought that it would be a blast to race a Predator. Richard Weatherley, managing director of Tenth Technology, graciously arranged to have one of the newer "International" versions of the Predator sent to our office.

KIT FEATURES

• **Drive train.** The Predator's design comprises a molded-composite tub chassis that contains the entire 4WD drive train. Adjustable ball differentials are mounted on the chassis in front and rear compartmentalized sections. A thick, carbon-fiber drive shaft runs the length of the chassis and connects the ball diffs through beveled pinion and ring gears. Because the diffs and drive shaft are held by the one-piece chassis, alignment is perfect, and flexing is minimal. The entire drive train, including the universal-joint drive shafts used at each wheel, is supported by high-quality ball bearings.

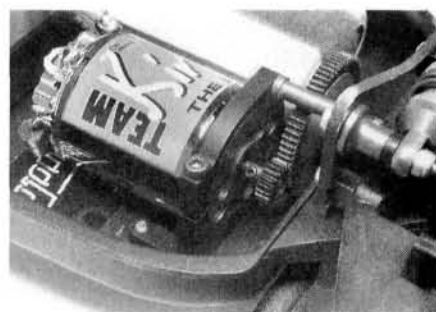
A molded spur gear is attached to the rear end of the drive shaft, and because of this, the motor must be mounted to the chassis in line with the drive shaft. A clever and effective aluminum motor-mount system allows incredibly precise gear-mesh adjustment and super-quick motor removal; you can accomplish these simply by loosening a single screw atop the mount.

• **Suspension.** Upper and lower molded wishbones are installed at each corner of the Predator's suspension. You can adjust front and rear camber by varying the number of spacers between the wishbone ends and the rod ends that are threaded into

them. Front caster can be varied slightly if you alter the position of a spacer on the upper wishbone's inner mount. Set the rear toe-in by changing the length of the tie rods that support the rear of the rear suspension hub carriers.

The Predator's roll centers can be subtly changed as well; in front, alter the number of spacers between the upper wishbone and the steering arm; in the rear, you have a choice of two holes in which to attach the insides of the upper wishbone.

The Predator's most unusual feature is its F1-inspired inboard shocks. Up front, pushrods and bearing-supported rocker



To easily adjust the gear mesh or to remove the motor, loosen just one screw at the top of the motor-mount system. To power my ride, I popped in a Trinity Kinwald Dirtinator epoxy-balanced 11-turn triple.

Building & Setup Tips

My Predator came fully built from Tenth Technology in England (usually they come in kit form) so I can't really describe the building process; however, I can impart some tips based on my experience maintaining and tuning it.

- When the car arrived, the pre-built shocks operated inconsistently. I disassembled them and rebuilt the seals using RCPS* Green Slime lubricant. This did the trick.
- Take your time when you install the steering servo and its linkage. The metal rod must be as straight as possible or it will deflect during hard cornering.
- The tie rods that actuate the front shocks must be the same length or the car will not handle well. To ensure that they are, check them with calipers when you build them.
- There are four types of ball end in the Predator. Study the instructions, and be sure to use the proper piece in each step.

My Predator was built using Brian Kinwald's setup from the '96 Florida Winter Champs off-road race.

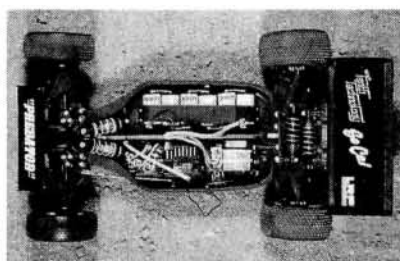
Front end

- Three, M3 washers were installed between the upper wishbone and its ball end for approximately 2 degrees of negative camber.
- Upper wishbone was mounted in the rearward position for greater caster angle.
- Optional "Grand Prix" rockers were used for front shock linkage; pushrods were mounted in the rearward hole.
- 35WT Trinity silicone shock oil with Tenth Technology yellow springs and one hole/one groove pistons.
- Approximately 1 degree of toe-out on each wheel.
- 16mm (0.63 inch) front ground clearance at ride height (battery, motor and electronics installed).
- 2-degree front wing angle.

Rear end

- Short ball joint with no washers on upper wishbone for approximately 11/2 degrees of negative camber.
- Upper wishbone mounted in upper hole in rear shock towers.
- Shocks were mounted in the middle hole in shoulder and the lower hole in the aluminum mount. The smaller portion of the shoulder was mounted on the inside of the car.
- 45WT Trinity silicone shock oil with Tenth Technology Gold P springs and two hole/one groove pistons.
- One washer between hub carrier and wheel hub.
- Lower wishbone was attached to hub carrier in the upper hole.
- 21mm (0.827 inch) rear ground clearance.
- Approximately 3 degrees of toe-in per side.

Horsepower Galore!



My goal was to duplicate Brian Kinwald's winning setup, and this meant running the same type of motor and batteries. I installed one of Trinity's* Team Kinwald Dirtinator 11-turn triple motors on the Predator's aluminum mount. This epoxy-balanced motor is without a doubt the fastest motor I've ever used in an off-road buggy—a bold statement, but I call it the way I see it. I geared the motor as Brian had geared his, using a 19-tooth, 48-pitch pinion.

I used Trinity's new World Tech, 30A cells (6-cell packs). The Predator was designed to use only stick-pack batteries; however, the World Tech cells are available only as individual cells (as are most high-performance matched packs). I used Trinity's Stick Pack Building Kit (RC5102) to assemble the cells into stick packs; I later learned that Kinwald had found an easy way to mount side-by-side packs in his Predator by simply removing the two outer-battery locating moldings. Oh, well!

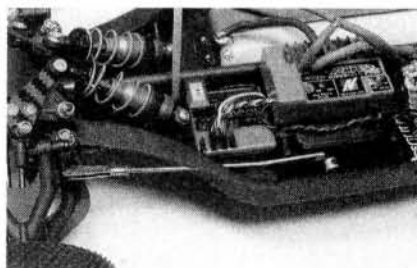
plates actuate the hard-anodized, Teflon™-coated shocks (also with hard-coated shock shafts) that are mounted deep inside the chassis. In the rear, similar shocks are mounted across the top of the rear diff housing and are actuated by molded stand-offs that are attached to the tops of the upper wishbones.

The shock geometry necessitates the use

of very stiff springs and thick shock oil. This is because of the ratio of suspension movement to shock compression; the suspension travel far exceeds the amount of shock movement. When set correctly, the suspension feels like a standard buggy's "outboard" shock setup—and it works great!

• **Steering.** It's accomplished through a bearing-supported, dual-bellcrank system.

A model-airplane-type adjustable clevis rod connects the bellcranks to the steering servo. The rod is about 4½ inches long and must pass through a hole in the chassis. I was extremely skeptical of this arrangement for fear that the rod would flex under load and cause erratic handling. After I installed the steering servo, however, I found that this setup provides nearly slop-free action as long as you install the rod so that it's as straight as possible.



For electronics, I chose a Novak NER-3FM receiver, a Novak Tempest ESC and a Futaba S9402 steering servo. My only minor gripe involves mounting the ESC on top of the steering servo—not my ideal choice. A model airplane-type clevis rod connects the steering bellcranks to the servo.

molded posts; however, to accommodate the Futaba servo, I had to slightly elongate the holes in the chassis (I'm not sure why, as you can bolt this servo into cars such as the B2 and Double-X without modification). The ESC is mounted directly atop the steering servo—not ideal, but absolutely the only option.

PERFORMANCE

I arrived at the SRS track in Tempe, AZ,

just in time for the first round of qualifying for the Cactus Classic. No practice time at all; a brand-new car; my hopes for an A-Main performance were dim.

I took one lap before the start of the heat and found that the Predator was responsive and fairly stable. At the start of the 4-minute heat, I grabbed all the throttle I could, and the car shot down the main straight at an unbelievable speed and with such a unique whining noise that crowds of spectators began to gather track-side.

The Predator took well to the SRS track's dry, packed surface, and the Tenth Technology's kit-supplied mini-pin tires (sold separately) worked adequately. I had heard that these cars weren't renowned for their jumping ability; however, my International version jumped very well and easily cleared the doubles and the triples. I actually had to drive more conser-



LIKES

- Brilliant, unique design.
- World-caliber performance.
- Highest-quality parts.
- Makes a cool sound.



DISLIKES

- Lower wishbones are made of thin, rigid material that can be easily snapped.
- Shock pivot shafts thread into plastic front-bulkhead cap, which can become stripped.
- Instructions could be clearer.

TEST GEAR

For best performance, 4WD cars should have steering servos with exceptional torque and speed. This is necessary to overcome torque-steer—the tendency of the driven front wheels to straighten themselves out under acceleration. I chose a Futaba* S9402 servo that produces unbelievable torque (111.1 oz.-in.), and it's quick, too (0.10 second/60 degrees).

Novak's* Tempest Pro ESC was the logical choice for the Predator; it is one of the most efficient racing ESCs available and can handle the hot motors used in 4WD mod racing; its unique Polar Drive™ circuitry means that it will stay cool even when installed in a "sealed" environment such as the Predator's chassis; it also has

THE COMPETITION	Yokomo YZ-10	Schumacher Cat 2000 E.C.	Tenth Technology Predator Intl. Team Car
	Wheelbase	10.5 in.	11 in.
	Width	9.67 in.	9.5 in.
	Weight	3.64 lb.	3 lb., 6 oz.
	Diff type	Ball	Ball
	Chassis	Carbon-fiber	Fiberglass
	List price	\$398	\$529.50
	Available at*	\$344.95	\$329.95
	Reviewed in	9/94	12/95
			9/96

*Prices vary with location.

THINGS YOU'LL NEED

- 2-channel radio with receiver.
- Servo (for steering).
- ESC.
- 6-cell stick pack.
- Ni-Cd battery charger.



Factory Options

- Paint for the body.
- Differential ball bearings—part no. AF4.
- Steering bellcrank and rocker-arm ball bearings—AF3.
- Adjustable-caster front wishbones—AS23.
- Grand Prix graphite rocker-arm plates—AS28.
- Anti-roll bar (1.25mm diameter)—AS21.
- Pure carbon-fiber rear shock towers (3mm)—AC25, rear; AC28, center.
- Hardened alloy and Teflon™-coated suspension balls—AS11.
- Yellow (soft) springs—AS20.
- Yellow springs with pre-compression spring insert—AS34.
- Purple (medium) springs—AS31.
- Graphite integral-molded chassis—AC21.

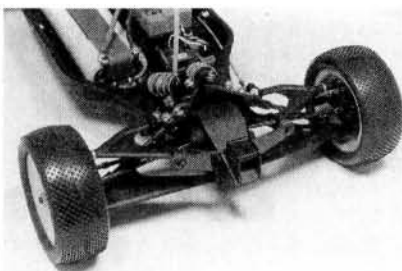
vatively over the jumps because I was overshooting them.

On the fifth lap, I heard a loud "snap" as the Predator landed nose-down after a set of double jumps. The marshal took one look at the car, then gave me one of those "It's all over, man" looks. The little nose-dive had resulted in a broken lower wishbone and a distorted ball end on the upper wishbone, and the shock's rocker-arm pivot shaft had been stripped out of the front bulkhead cap. Luckily, I had spare parts to repair the arms, but I had to resort to using CA to hold the pivot shaft in place.

Changes For American Tracks

The Predator was designed for European tracks, which usually lack large jumps and often are made up of a variety of surfaces, including short grass. The car Brian Kinwald used to win the Winter Champs (and the car reviewed here) is what Tenth Technology calls its "International" model; it incorporates many changes specifically intended to improve the car's performance on U.S. tracks, which have dirt surfaces and large jumps.

First, a slipper clutch—a common feature on most competitive buggies—was fitted to the rear of the Predator's main



The inboard shock system on the Predator was adapted from full-size F1 technology. The shocks are hard-anodized and Teflon™-coated (the shock shafts are also Teflon™-coated).

The Predator's wishbones are very light, thin and rigid. Add to this the fact that the front lower wishbones are mounted on the chassis without any kick-up or rake, and you can understand why the wishbone broke. If the front wishbones pivoted upward and rearward, as they do on other types of buggy, e.g., the YZ-10 and the Lazer, mine probably wouldn't have broken. After the first heat, Brian told me that he had never broken a wishbone on his Predator. As for the pivot shaft, a part that's subjected to a large degree of force shouldn't be threaded into a plastic part such as the bulkhead cap.

After I had made these repairs, the Predator performed flawlessly for the three remaining heats and through the Main.

The second round of qualifying revealed the true potential of the Predator: it proved extremely stable from side to side. With the addition of the front one-way bearing, it cornered as tightly as a 2WD buggy. For round three, I decided to change to Pro-Line's* Square Fuzzie tires to see if they would make a difference. Square Fuzzies aren't made to fit a narrower 4WD front wheel, so with the aid of Pro-Line's tire engineer Tim Clark, I made a pair of narrow fronts by removing the strip of material from the

drive shaft. The slipper reduces wheel-spin on slippery tracks and makes the car more stable going through ruts and over bumps. Next, Tenth Technology added a one-way bearing to the front of the main drive shaft. This feature allows the front wheels to freewheel when the car travels forward, and it greatly increases initial turn-in during cornering. Also, because there's less drag, straightaway speed is slightly increased.

Lexan undertrays, which fit under the front and rear wings to provide a true, air-foil cross-section, are also part of the International package.

SPECIFICATIONS

SCALE 1/10
LIST PRICE \$670

DIMENSIONS

Length overall 17 in.
Wheelbase 11.19 in.
Width (F/R) 9.75 in.
WEIGHT (gross, RTR) 3 lb., 12 oz.

CHASSIS

Type Plastic tub
Material Fiber composite

DRIVE TRAIN

Type Shaft-driven 4WD
Primary Pinion/spur
Transmission Universal drive shafts
Differential(s) Front and rear ball
Slipper clutch Friction-type
Bearings/bushings Bearings

SUSPENSION (F/R)

Type Upper and lower wishbones
Damping Oil-filled shocks

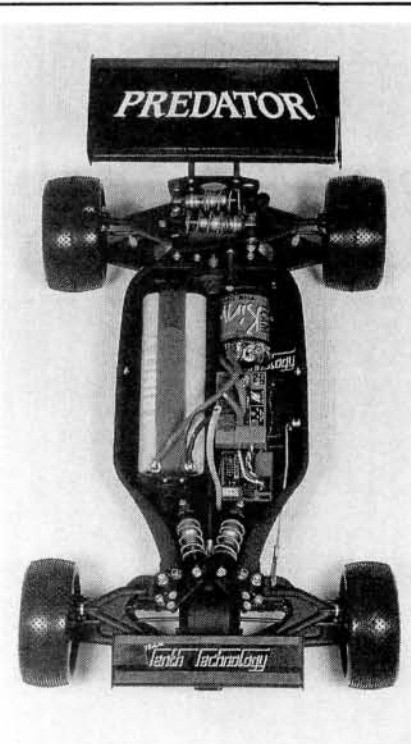
WHEELS (F/R)

Type One-piece plastic
Dimensions (DxW) 2.2x1/2.2x1.5 in.

TIRES (F/R) Mini pin

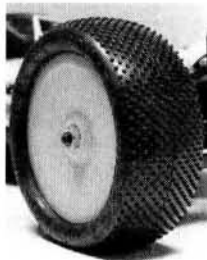
ELECTRICS Not included

tires' centers, then gluing the remaining halves together. This is what many of the racers did at the '95 IFMAR worlds in Japan.



As you can see, this is no ordinary-looking 4WD buggy! The Predator tested in this article is the "International" version; it was designed for the features of American tracks—larger jumps and dirt surfaces.

The tires did the trick; during the third round, I was able to post a time that would place me eighth on the starting grid of the A-Main. Not bad for the car's third time on the track! During round four, I picked up a few more seconds and was bumped up into the sixth spot. At this point, the



With help from Pro-Line tire engineer Tim Clark, I made a set of narrowed Square Fuzzies for the front of the car. These tires were the hot setup at the Cactus Classic (see the race report elsewhere this issue).

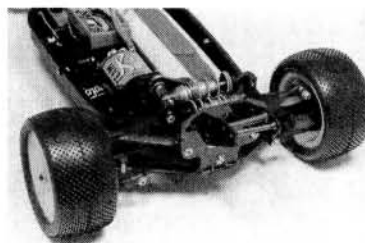
Predator was definitely working better than my driving! Although the track's condition had deteriorated a bit during each round, the Predator seemed not shaken at all.

At the start of the A-Main, I pinned the throttle and hoped that the Predator's incredibly efficient drive train and the Dirtinator motor's horsepower would allow me to quickly pass a few cars down the straight. I passed two cars

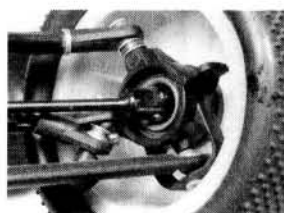
and shot to the top of the sweeper to get a clear shot at the remaining ones. The Predator rocketed down the sweeper and into second place behind the leader.

Lacking delusions of grandeur, I was happy to remain in second, but a nasty traction roll sent the Predator up and over the sweeper on the third lap. An astute spectator tossed the car back onto the track (now in fourth position), but the crash had caused one of the rear wing's side dams to break away and flap in the breeze—what a distraction!

To gain ground, I began to push the Predator to my limits (not the car's!). I managed to work up to the third-place car; on the last corner, he rolled, and I sneaked by into third. Hey! I'll take that!



The inboard rear shocks are mounted across the top of the rear diff housing. Pro-Line Square Fuzzies front and rear were my tires of choice while racing the Predator.



Ball-bearing-supported universal-type drive shafts get the power to all four wheels.

FINAL THOUGHTS

The Predator is a unique, and—dare I say—brilliant, design. It shakes the cage of conventional buggy design, and it works. It's an expensive car, but it is top-quality throughout. It's like buying a Mercedes; you know you're paying more, but after you've spent time with it, you

begin to see where the money was spent.

In my opinion, some of the plastic is too brittle for its application; the front wishbones come to mind. To prevent cracking during crashes, the rear wing should be more flexible. Otherwise, the car proved durable; and who can argue with the results? Kinwald won with it in Florida, and a decent, but certainly not world-class racer like me did well at a big race; this only goes to prove that the Predator is more than an exercise in design; it's a performer.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

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2WD Sportsman 1st:____ 2nd:____ 3rd:____ Sportsman Truck 1st:____ 2nd:____ 3rd:____
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Make checks payable to: MnM Hobbies, 4225 Prado Rd. #101, Corona, CA 91720.

Tuning and modifying the

HPI RS4



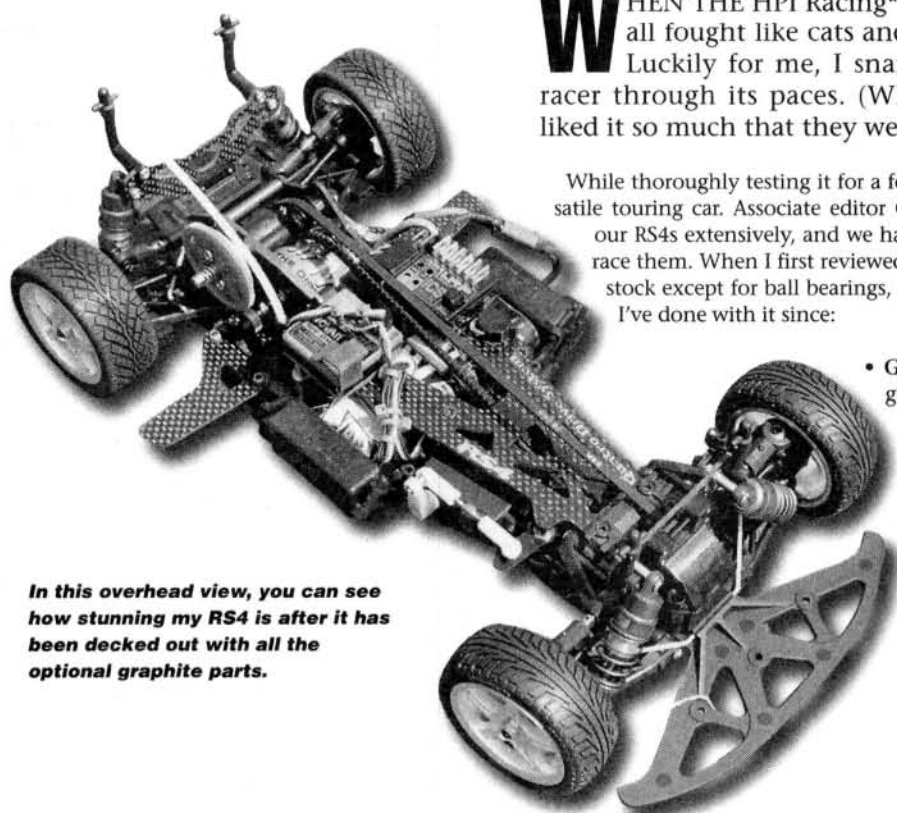
The Tozai Nissan Skyline GT-R body set is accurately detailed and comes with a full set of stickers (window moldings, headlights and taillights, all the scoops and vents, etc.). The rest of the stickers were snagged from a Tamiya Nissan Castrol Primera sheet.

by John Howell

WHEN THE HPI Racing* RS4 arrived in our office last winter, we all fought like cats and dogs over who would get to review it. Luckily for me, I snared the honor of putting the hot new racer through its paces. (When they saw mine, the other editors liked it so much that they went out and got their own!)

While thoroughly testing it for a few months, I found that it's a very potent and versatile touring car. Associate editor George Gonzalez and I have messed around with our RS4s extensively, and we have them pretty much dialed-in wherever we go to race them. When I first reviewed the car in the May '96 issue, I ran it relatively box stock except for ball bearings, and I ran it in the wide configuration. Here's what I've done with it since:

- **Graphite components.** I replaced the stock fiberglass chassis and upper deck with HPI Racing's graphite chassis. While I was at it, I added a set of HPI's graphite nerf wings, gearbox plate and rear shock tower and a Kose* graphite front shock tower. I lightly sanded the edges of each

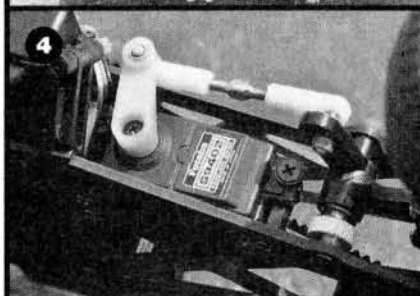
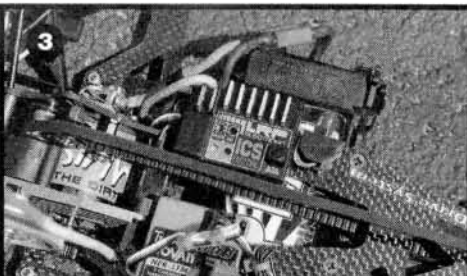
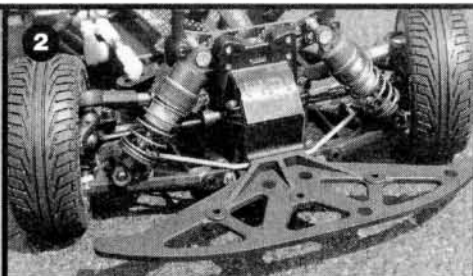
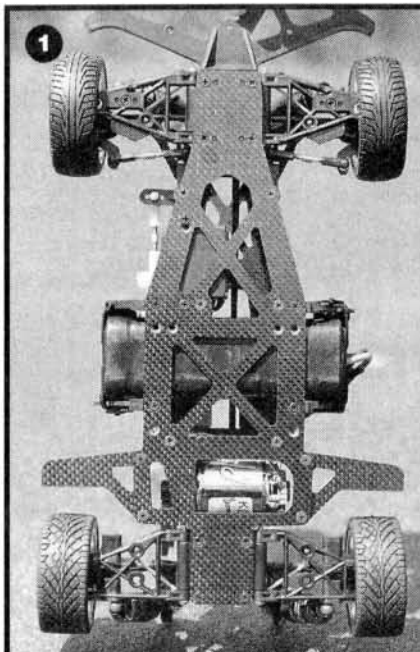


In this overhead view, you can see how stunning my RS4 is after it has been decked out with all the optional graphite parts.

SETUP

- Front shocks: 15WT Trinity silicone oil, no. 1 piston (soft prototype springs).
- Rear shocks: 15WT Trinity silicone oil, no. 2 pistons (medium prototype springs).
- 1-degree toe-in.
- 1.5 degrees negative camber on all tires.

PHOTOS BY JOHN HOWELL



1. From underneath, you get a better look at the graphite chassis plate. 2. I tried HPI's new radials up front, but I ended up replacing them with stickier HPI slicks for more traction. I mounted the stiffest HPI swaybar up front (purple) and HPI's new, wider front bumper. 3. For electronics, I chose a Novak NER-3FM to pick up the radio waves from my Airtronics Caliber 3Ps, an LRP ICS digital ESC (I started out with the current limiter at 120, then quickly switched to 80), a Trinity 15T Kinwald Dirtinator and an assortment of Trinity batteries (ranging from basic Zip Packs all the way to their new killer 30A cells). 4. For steering, I used a Futaba S9402 servo (yes, it's overkill with 111 oz.-in. of torque and a 0.10 second/60 degree transit speed, but I like it!). 5. In the rear, I tried Pro-Line's new Sedan Speed Hawgs. After a few runs, I eventually pulled them off and bolted on a set of HPI slicks, which worked better on our track.

graphite piece and applied a little thin CA to the edges to help prevent the graphite from splitting. I must admit that the graphite chassis set does not noticeably enhance performance, but if you want your car to look extra-sano, then this is a "must mod"! HPI's graphite chassis is lighter, and yes, it is stronger, but the car's upper and lower deck design makes the

stock double-deck fiberglass chassis just as rigid. If you want to increase performance, you might want to forget the graphite chassis setup; you can spend your money better on other mods.

• **Aluminum motor plate.** Out went the stock motor plate, and in went one of HPI's optional plates. The new plate is finned,

and this helps to cool the motor. It looks pretty cool, too!

• **Drive shafts.** When I started to hop up my RS4, B.J. Christensen at MIP* told me that they planned to make CVDs in both wide and standard for the RS4. According to MIP, their CVDs provide positive acceleration, have near zero backlash and don't bind up. I must admit that I don't have any way to accurately measure the performance difference between CVDs and standard universals, but I've never had drive-shaft failure while using CVDs. In the past, my other vehicles have, however, ejected some dogbones/drive shafts from other manufacturers.

• **Turnbuckles and hinge pins.** At each corner of the car, I replaced the stock steel turnbuckles with a beefy titanium set from HPI. Also, I replaced all the stock steel hinge pins with a set of silky-smooth, stainless-steel hinge pins from HPI. I rounded out the steering system with titanium turnbuckles from Lunsford Racing* and HPI.

• **Swaybar kit.** When I started racing the car, I used one of HPI's optional swaybar kits. Initially, I ran the softest setting (red swaybars) both front and rear. Now I run the thickest one up front (purple) and the medium one (green) in the rear. I had a hard time getting traction on one track sur-

PARTS LIST

HPI Racing

- Ball-bearing set for RS4.
- Graphite chassis kit (upper and lower).
- Graphite nerf wings (wide).
- Graphite gearbox plate.
- Graphite rear shock tower.
- Fourteen-tooth one-way pulley.
- Front and rear swaybars.
- Aluminum pilot shaft.
- Motor plate with cooling fins.
- Titanium turnbuckle set.
- Stainless-steel hinge pins.
- Swaybar kit.
- Five-spoke wheels.
- Prototype springs for Super Shocks.

KOSE

- Graphite front shock tower.

NOVAK

- NER-3FM 27mHz receiver.

FUTABA

- S9402 steering servo.

LRP

- ICS digital ESC.

TRINITY

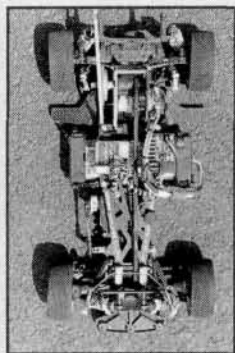
- Team Kinwald Dirtinator 15-turn triple motor.
- Assorted battery packs (from Zip Packs to 30A cells).

TOZAI

- Nissan Skyline GTR body set.

PRO-LINE

- Sedan Speed Hawgs.



Second Opinion

by George M. Gonzalez

Both John and I got our HPI RS4s at around the same time last winter. Much to our disappointment, we got them during one of the worst snowstorms in East Coast history. Because we're diehard racers, though, we weren't going to let a little thing like snow stop us. We took refuge in underground parking lots and at local indoor tracks. John and I spent countless hours getting our rides dialed in, and after we had put in ample track time, we were forced to put them

down for a while to concentrate on other projects—at least, I was. John, on the other hand, set off to build the ultimate RS4 in his secret laboratory.

When John emerged, he had transformed his car into a parking lot weapon, and suddenly, we weren't playing on a level field any more. Of course, I wasn't going to let him get away with that, so I gave Japan R/C Imports* a call. Within a few days, I received a ton of Kose and Tozai hop-ups for the RS4. Here's a list of all the items I installed on my car in an effort to even things up with John:

KOSE

- F/R shock towers.
- F/R stabilizer-bar sets.
- F/R universal drive shafts.
- Hardened outdrives.
- Super steering set.
- Seven-piece titanium turnbuckle set.
- Aluminum servo mounts.

TOZAI

- BBS wheels (white).
- Type C super slicks (soft front).
- Type D super slicks (medium rears).

HPI RACING

- Narrow Mercedes DTM body.
- Finned aluminum motor mount.
- Graphite gearbox plate.
- Full ball-bearing kit.
- Graphite nerf wings.

ELECTRONICS

- LRP digital ICS ESC.
- Novak NER-3FM receiver.
- Extreme Motor Sports* dyno-tuned 15-turn touring-car motor.
- Futaba FP-S131SH high-speed servo.

- Assorted Trinity EX-Tech 1400, 1700 and 1800mAh battery packs.

MISCELLANEOUS

- Tamiya* tuned springs—red (F), blue (R).
- Deans* Ultra plugs.
- Kimbrough* servo-saver.

SUSPENSION SETUP

- Front shocks: Tamiya red tuned springs, no. 1 pistons, Trinity 15WT oil.
- Rear shocks: Tamiya blue tuned springs, no. 2 pistons, Trinity 15WT oil.

AT THE TRACK

The moment I laid my car on the track, it was dialed—period! I never made any adjustments to the car nor had any reason to. The Tozai slicks and Kose parts are awesome! I was very surprised that I was able to hang with the Doogster because his car was set up wide and mine was narrow. My car actually seemed to turn into the corners much better and was every bit as stable. The only advantages John's car had were that it seemed to come out of the corners a little faster, was slightly more stable in the straightaways and had much more horsepower. I asked Doog what wind his Trinity DIRTinator motor was, and he answered, "A 15-turn triple." Yeah, right!

Even though Doog's car had more power and was set up wide, my car was definitely more dialed. In a 4-minute race, I finished a full lap ahead! Doog went back to the pits with his shoulders hunched and the agony of defeat in his eyes, but he made one adjustment after another until he was content with the way his car felt. I have never seen him so determined to kick my butt! By the end of the day, the tables had turned, and Doog's lap times were getting faster and faster. In the last race, his car was so dialed that I had a hard time keeping up. When the race was over, he had lapped me twice, so things were looking pretty bleak for old George.

We raced all afternoon and into the evening, and I have to admit that it was the most fun I had racing in a long, long time (Doog and I have always been very competitive). I can't honestly say which of us was the overall winner because this would become the topic of heated discussion for weeks to come. I can safely say, however, that Doog won't underestimate his opponents—or my RS4—any more!

face, and switching over to the stiffer sway-bars eliminated my handling woes. This is one of the best tuning mods you can make.

• Front bumper and miscellaneous items.

The day before I shot the photos for this article, HPI's Kent Clausen called to tell me that he was sending a few new pieces for the RS4. These included a wider front bumper, molded composite nerf wings (I stuck with the graphite ones because they were already on the car) and lightweight aluminum pilot shafts.

• **One-way pulley.** Instead of installing one of HPI's one-way front diffs, I installed a 14-tooth one-way pulley. It allows you to overdrive the front wheels, and this makes the car only rear-wheel drive at a certain speed. When I used it the first time, I had all sorts of traction problems (see "Performance" section). According to HPI, the one-way diff is the hot setup on most tracks.

• **Electronics.** To control my wild ride, I chose some of the best electronics available. To receive the radio waves from my Airtronics* 3Ps, I used my trusty Novak* NER-3FM receiver. To help propel my car to blistering speeds, I tossed in a hellaciously fast, epoxy-balanced, 15-turn triple Trinity* DIRTinator. A wide assortment of Trinity packs, ranging from Zip Packs all the way up to my killer 30A cells, provide juice to the car. A state-of-the-art LRP ICS digital ESC distributed by Associated Electronics* transfers all that electricity to the motor. One of Futaba's* newest servos—an S9402—steers the car. Yes, George laughed at me when he saw it, but it has plenty of torque, and it's wicked fast (111 oz.-in. of torque and a 0.10 second/60 degrees transit speed). Sure, it's overkill for this application, but hey, it works great!

• **Body.** I had been racing the RS4 with a Ferrari body, and it was starting to get a little banged up. One day, I mentioned this in our office and that I wanted to spruce up the car before the photo shoot. On the day before the shoot, George gave me an absolutely stunning, painted Tozai* Nissan Skyline body, which he had totally decked out for me the night before. Let me tell you, folks, these pictures don't do it any justice; it's by far one of the nicest touring-car bodies I've ever seen. Many thanks to the G-man!

• **Tires.** I used a wide variety of tires, from HPI and Pro-Line* radials to super sticky slicks from HPI.

PERFORMANCE

As I said earlier, I have found the RS4 to be a very fast and competent racer. Also, it was easier to build than any other car I've had. My only gripe is that it's a pain to work on. All that goes out the window, though, the

minute I put this car on the track. It's a solid performer that makes me easily forget about any tuning hassles that I might have endured the night before.

When George and I started racing our RS4s regularly, we went through the usual setup and tuning stage. We race at a track that we built across the street from our office on a freshly paved, vacant parking lot that's as smooth as glass. It has a tight technical section and two really long straightaways. Sometimes, the track gets a little dusty, and then it gets a little loose (radials are the tire of choice then). But when it's clean and supersmooth, look out!—traction galore!

When I put the car down for the first time after I had modified it, I ran a quick lap and found that it had absolutely no rear traction. I went into a corner with some speed, and the rear end started to chase the front. I even had problems getting on power without fishtailing to the right and left. I ran a few more laps and started to experiment with dialing in more brake to enter the corners a little hotter—no dice. Next, I worked with my torque limiter so that the car wasn't so "punchy"—slightly better.

At this point, George and I started a little impromptu race, and he was kickin' my butt hard! His car was sooo dialed. Hmmm...I noticed that he was running some soft Tozai slicks and was getting gobs of traction. I'd have to get a set of those—very soon, as a matter of fact! I was running HPI radials and Pro-Line's new Sedan Speed Hawgs, but they weren't hooking up very well on our particular track. By the time we both dumped, George had a complete lap over me—aar-rgghh! It was time to try a few more tricks.

I was running the lightest swaybars (red) both front and rear, so I switched to the stiffest one up front (purple) and the medium stiff (green) in the rear. Then I switched to HPI slicks—much better!

After a few laps, I pulled into the pits to try a few more things. I wanted to remove the 14-tooth one-way pulley to see whether that would make any difference in performance. As soon as I took it off, the car was totally dialed in! I was able to pitch it into the corners, and, thanks to the stiffer swaybars and wide configuration, the car completely "railed" through them.

Now that I was more comfortable with how the car handled, it was time for another race. George and I put our cars on the grid and set the timer for a 4-minute heat. When we took off, it was clear (at least, in my mind) who would end up victorious: me! By the end of the race I had lapped the G-man twice—ah, yes—a good feeling! At last, all my efforts in the pits paid off, and I had a car that I felt I could take anywhere and be competitive with.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176.

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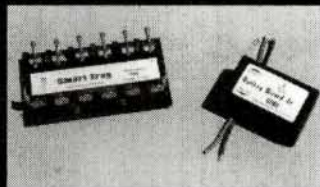
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YOKOMO **YR-4M**

by B.J. Christensen

ATENTION road and parking lot racers around the globe: Yokomo* has recently unleashed its new YR-4M 1/10-scale electric sedan, and it is sweet!

Though sedan class cars were aimed strictly at the entry level when they first appeared, they have evolved into full-blown racing machines. And now that sedan class racing's popularity is skyrocketing throughout the world, the competition has definitely become heated. At its debut earlier this year, the Yokomo YR-4M dominated the NORRCA On-Road Nationals in Las Vegas. This domination generated an enormous buzz around the track: the word in the pits was that the YR-4M was a must-have. As a skeptic, I'm

not one to believe all the hype. I jumped at the chance to "Thrash Test" the YR-4M and find out whether it lives up to its reputation.

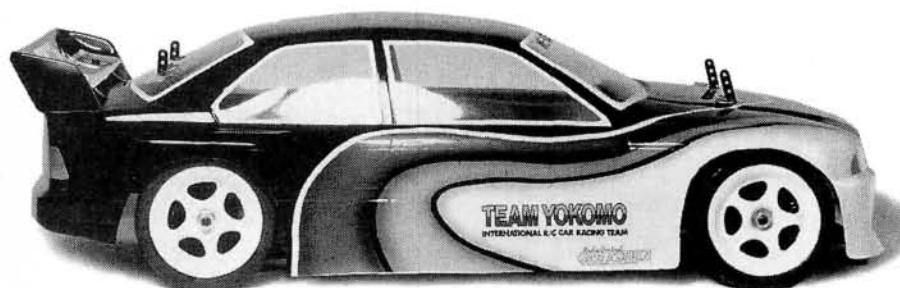
KIT FEATURES

This is not an entry-level kit but a top-of-the-line, super competition ride. No expense was spared in the kit's production.

The YR-4M is solid from the ground up. Its chassis is made of a high-grade, rigid carbon-graphite material that doesn't flex. Unlike the other touring cars on the market, the YR-4M has a battery configuration set up for saddle packs rather than the standard stick-pack alignment.

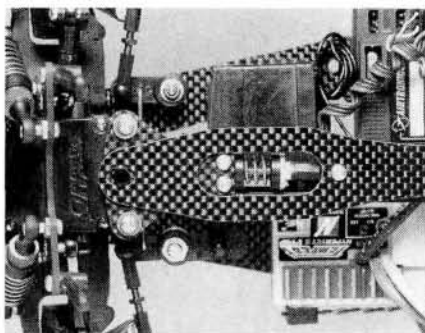
tokyo's top
touring car

SEPTEMBER 1996 81



To complete the chassis, Yokomo has included a new three-piece upper deck. It's designed to stiffen the chassis while using a shock absorber to increase rear traction and help prevent the drive belt from skipping.

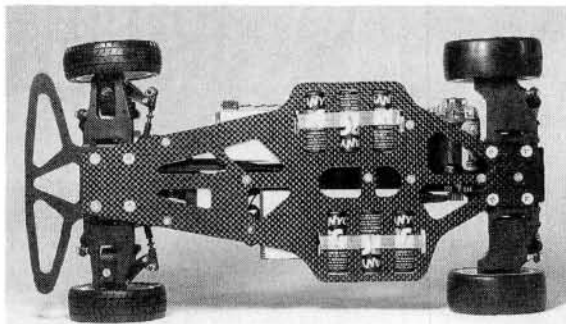
The YR-4M's drive train is very similar to those of its close relatives—the YR-4 and off-road YZ-10. The front and rear ends feature high-quality ball differentials and universal drive shafts. A direct-drive belt system transfers power throughout the car from its mid-mounted engine. Yokomo has also put one-way bearings on the center gear adapter. They help to give the car more punch, steering and overall top speed. The YR-4M also came equipped with NMB sealed bearings throughout to cut down on excess drag. The drive train was supersmooth and free without any run time on it.



Yokomo's new three-piece upper deck uses a shock absorber to increase rear traction and to help prevent the drive belts from skipping.

No stopping there. The car's four corners feature improved stiff suspension arms. Yokomo also included a graphite stiffener for the front spindles and fully adjustable upper camber links. The steering assembly, however, rubbed me the wrong way; it had a little too much slop for my taste. At first glance, the shocks that round off the suspension seem quite small, but don't be deceived. They are highly precise and keep down the weight of the car. I installed them with the standard one-slot pistons and Team Associated* 40WT silicone oil. I also used Silver springs on the front shocks and a set of blacks on the rear.

To finish my assembly, I mounted the supplied narrow radial tires in the front and a set of wide slicks in the rear. The



A bottom view of the YR-4M shows how the graphite chassis has been cut out for 6-cell saddle packs to lower the center of gravity.

Building & Setup Tips



- Use a file or fine sandpaper to smooth out all the sharp edges on the graphite chassis and top plate. Then run a bead of thin CA around all the edges to safeguard against cracking and fraying.
- When tightening the plastic shock ends on

your shock shaft and cap, use calipers to ensure that your front and rear shocks are of the same overall length. Down-travel is very important in on-road racing. Uneven travel will hinder a car's performance.

- After you've taped your steering servo into place, apply a thin layer of Shoe-Goo around the edge to secure it well; this will prevent it from rocking back and forth under load.
- Take your time when assembling the shocks. Try not to get air in them. They are extremely

YR-4M kit does not include a Lexan body, so I chose Elite's* sleek-looking BMW. Because looking good is half the battle, I enlisted painter extraordinaire Mike Weed of Weedezine* for a custom paint job.

TEST GEAR

To finish off my ride, I installed top-of-the-line products. I equipped it with the new Airtronics* Caliber 3Ps radio, an FM receiver and 94156 steering servo. For the electronic speed control, I chose Novak's*

THINGS YOU'LL NEED

- Radio.
- Steering servo.
- Electronic speed control.
- Motor.
- Battery pack.
- Battery charger.
- Lexan body.



Factory Options

- Machined-aluminum motor mount—part no. ZC-304S.
- F/R anti-roll bar kits—ZR-412F and ZR-412R.
- Sponge bumper—ZR-001F.
- Elite offers a number of different body styles for the Yokomo YR-4M.

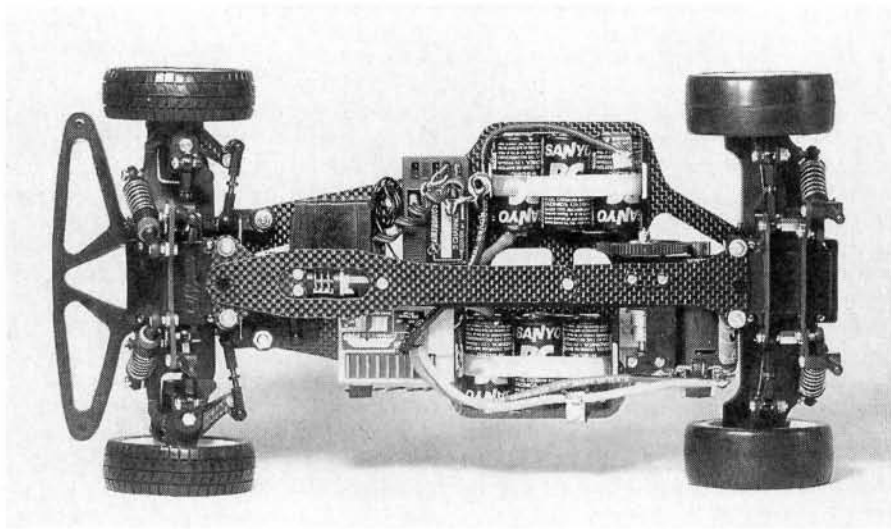
super-smooth Tempest Pro. My need for speed was overpowering, so I bolted in a Reedy* modified 10-turn double—geared 19T/78T. The batteries were 1700 SCRC matched packs, also from Reedy.



PHOTOS BY B.J. CHRISTENSEN

small, and air bubbles will significantly affect their performance.

- After your tires have been glued onto the wheels, use a tire balancer to ensure that they are in perfect balance. Every little bit counts.
- Always use a high-quality strapping tape to secure the batteries to the chassis. There is nothing more embarrassing than having your batteries fly out of your car.
- Use shims on top of the front steering posts to remove the excess slop.



This top side view reveals how well-balanced the battery, motor and radio gear are on the chassis.

SPECIFICATIONS

SCALE 1/10
LIST PRICE \$425

DIMENSIONS

Length overall 13.74 in.
 Wheelbase 10.16 in.
 Width (F/R) 6.5/6.14 in.

WEIGHT (gross) 3 lb., 5 oz.

CHASSIS

Type Double-deck
 Material Graphite

DRIVE TRAIN

Type Direct drive belts
 Primary Pinion/spur
 Transmission Universal swing shafts
 Differentials Ball

Slipper clutch None
 Bearing/bushings Bearings

SUSPENSION (F/R)

Type 4W, independent
 w/adjustable upper link
 Damping Oil-filled, coil-over shocks

WHEELS (F/R)

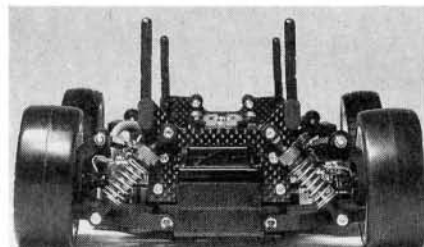
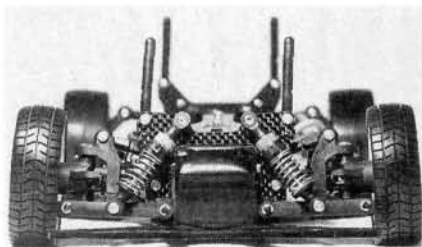
Type One-piece plastic
 Dimensions 2x0.626, 2x0.866 in.

TIRES

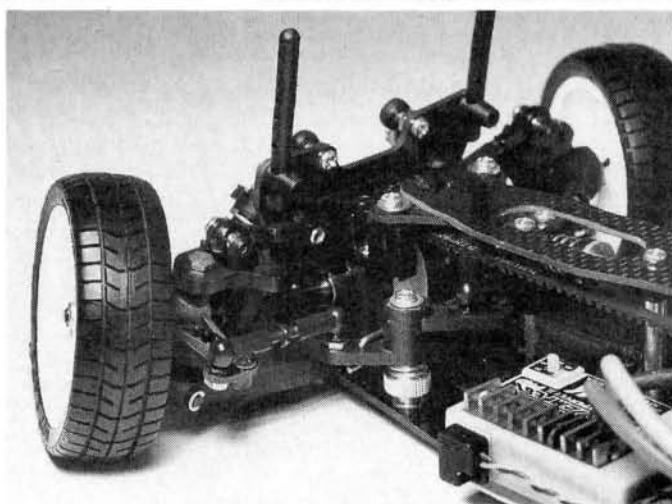
Front Yokomo narrow tread
 Rear Yokomo wide slicks

ELECTRONICS

Motor, battery, ESC Not included



The front end features lightweight racing shocks, super-stiff suspension arms, a graphite shock tower, universal drive shafts, adjustable camber links, super-narrow wheels and radial tires. The spindles now sport a graphite stiffener for more steering control.



LIKES

- High-quality precision parts.
- No upgrades are needed to be competitive.
- The locations and balance of the batteries and radio equipment.
- Narrow front tires enhance steering.
- Performance on the track.

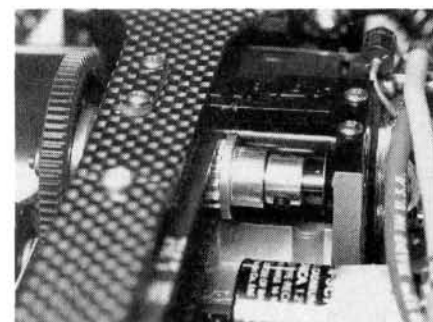


DISLIKES

- Instructions are not clear enough for beginners.
- Front steering assembly is a little sloppy.
- No hole in the chassis for an antenna mount.
- Few options for shock setup and camber locations.

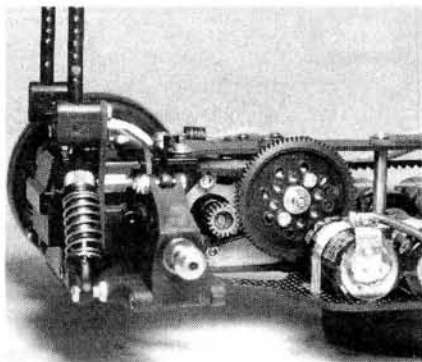
PERFORMANCE

Let's see what this car can do. I wasted no time and headed straight to Revelation Raceway in Montclair, CA. After I had made some final trim adjustments on my radio, I took off on my first lap. Although I was taking it easy, I immediately noticed that this car had a ton of traction. As I became more familiar with the car and track layout, I picked up the pace. The car was very easy to drive. I think I hit the suspension setup right on the nose. It was very consistent and stable and held its line well around the track without much chassis roll. The YR-4M also had excellent steering when it exited the corners, but I added 1 degree of front



Yokomo had the foresight to include a centralized one-way unit, which is a strong contributor to this car's awesome performance. This is an expensive option on some of the other touring cars on the market.

YOKOMO YR-4M



The rear end has many of the same hot features as the front. Check out the aluminum motor mount and the beefy rear axle carriers.

toe-in so that it would turn in a little harder. What can I say about the acceleration other than that it's tremendous? The car was an absolute rocket from point to point. There was no slip or lag in the throttle response. I out-accelerated every other touring car on the track. With my first test day complete, I was an average of 1/2 second faster per lap with the YR-4M than I had been with any other touring car on this track under the same conditions.

To give this car an extensive test, I felt that it was necessary to see how it would perform under not-so-perfect track conditions. The next track I tested it on was laid out on an asphalt parking lot and then sprayed with sugar water. With my

setup the same as before, I hit the track. The results were exactly the same. I had plenty of traction, acceleration and steering while many of the other cars seemed quite loose. The rough surface was also no problem for the YR-4M. Its excellent suspension handled everything the track had to dish out.

FINAL THOUGHTS

What's the verdict? I was very impressed with the quality of all the parts in the kit. The performance was simply outstanding. The Yokomo YR-4M is definitely the hot ticket for the serious racer. The instruction booklet was a little weak on details for a beginner, but if you want a touring car with world championship

performance, this is it. I can now say that the YR-4M lived up to the buzz I heard in the pits.

**Addresses are listed alphabetically in the Index of Manufacturers on page 176.*

THE COMPETITION	Kyosho TF-2	Tamiya TA02 RS	HPI RS-4	Yokomo YR-4M	Tenth Technology Predator DTM
	Wheelbase 10.3 in.	10.5 in.	10 in.	10.16 in.	10 in.
	Width (F/R) 8 in./8 in.	7 in./7.2 in.	8.65 in./9 in.	6.5 in./6.14 in.	7 in./7.25 in.
	Weight 3 lb., 4 oz.	3 lb., 5 oz.	3 lb., 5 oz.	3 lb., 5 oz.	3 lb., 5 oz.
	Diff type Gear	Ball	Ball	Ball	Ball
	Chassis Graphite/aluminum	Plastic	Black fiberglass	Graphite	Resin composite
	Price \$259.99	\$320	\$298	\$425	\$479
	Available at* \$199	\$169.95	\$199.99	\$319.95	\$320
	Issue reviewed 8/95	TC	5/96	9/96	7/96

*Prices vary with location.

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SCHEDULE:

Friday—practice;

Saturday—sign-ups, 8 a.m., racing starts 10 a.m., two qualifying rounds;

Sunday—concours at 9 a.m., racing starts 10 a.m., one qualifying round and Mains.

ENTRY FEE:

\$35 first entry;
\$30 each additional entry.
Limit three entries per driver.
First entry includes event T-shirt.

RACING PROGRAM:

A—B—C

Location: **Rotary Park, on the Lake, Lake Havasu City, Arizona**

October 12-13, 1996 (limited to 300 entries)

RULES:

NORRCA rules apply. NORRCA membership required

TROPHIES:

Presentation on Sunday after the Mains.



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2WD Sportsman 1st: _____ 2nd: _____ 3rd: _____ Sportsman Truck 1st: _____ 2nd: _____ 3rd: _____

4WD Modified 1st: _____ 2nd: _____ 3rd: _____ Make checks payable to H.R.C.C.C.

Mail to H.R.C.C.C., 1990 N. McCulloch Blvd. #D118, Lake Havasu, AZ 86403.

Get Good Starts

IN PAST ISSUES, we seem to have covered just about every part of racing radio-controlled cars, except for starts. Starts may be the most important part of racing. This is especially true of 1/10-scale electric racing, where the races are only 4-minutes long. If you have a bad start, you might find it impossible to catch up to the leader—who probably got a great start—and cross the finish line ahead of the pack.

Launch off the line with confidence

by Jack Johnson

Although there are several strategies that you can use in starts, I don't rely exclusively on any one. Instead, I choose my strategy to suit where I am on the starting grid and who's near me. In this article, I'll cover basic strategies for starting from the front, middle and rear of the pack. I'll also hit on some pointers to keep in mind when it comes to starts.

GENERAL PRINCIPLES

The single biggest mistake that people make when it comes to starts is trying to win the race in the first turn. I don't know about you, but I couldn't tell you who led the first lap of any major race

I've ever attended. What matters is who crosses the finish line first. To do that, you'll need a reasonable start; the best way to achieve one is simply to try to survive the first lap. Sure, it's a bonus if you wind up in front of the pack, but as long as you're reasonably close to the leader, you're looking good.

The most important thing to remember, regardless of your strategy or where you sit on the grid, is that you must always get your vehicle to the inside of the first corner as quickly as possible. If your vehicle is all the way to the outside, it's unlikely that you will be forced to the outside in the first turn, and it'll be a lot easier to get around the turn cleanly.

I'M IN THE FRONT ROW!

If you're good—or lucky—enough to be in the front row at the start of the race, your job is much easier. The strategy here is simply to get to the first turn as fast as possible. This is no time to be asleep when the horn goes off. If I know I'll be starting at the front of the pack, I like to hang out at the track for a few races before mine and listen to the starts. There is usually a fairly consistent delay between the time the announcer gives a final warning and the time that the horn sounds. If you know approximately how long that delay time is, you might have a huge advantage.

Two things can affect the behavior of your vehicle when you put the pedal to the metal: one is

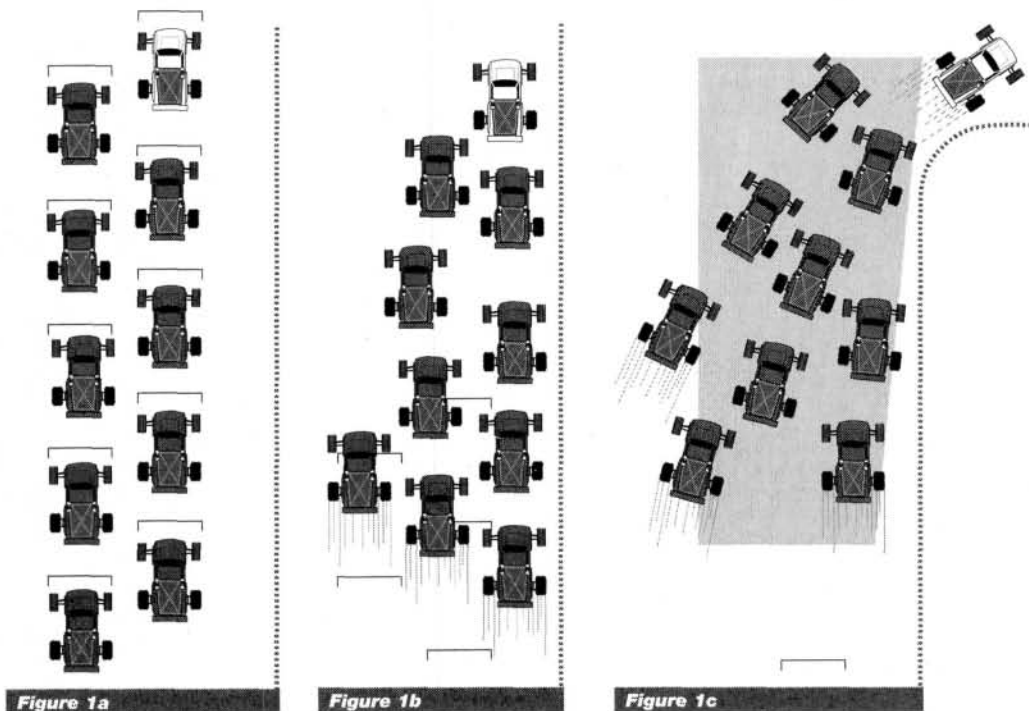


Figure 1. Here's an ideal start from the pole position. This diagram illustrates the technique of "hiding" around the first turn. The idea is to get your car through the apex of the turn as soon as possible by braking late, turning hard and staying as far to the inside as possible. If you complete the turn early, you'll be out of the way of any cars that overshoot the first turn.

the track itself, and the other is the chassis tweak. The following tips are important regardless of your position on the grid, but they become especially important if you are in the front row.

- **The track.** Any potential problems here can be overcome with a little preparation. The first thing to look for when you put your vehicle on the starting line is dust and loose dirt. This is especially important if you're on a dry, off-road track. Before the start of an A-Main, many pit people sweep the starting grid where their vehicle is lined up. This is to ensure that both tires (or all four tires on 4WD cars) have the same amount of traction and that the car doesn't pull in one direction.

Bumps on the track surface can also cause problems on the starting grid. Check the area around where your car will be lined up. If there are bumps, try to line up your car so that you won't be trying to accelerate through them. If one rear tire hits a bump while it accelerates off the line and the other tire is on a smooth surface, your vehicle will probably veer off in the direction of the bump and send your car right into the car next to it. This isn't a good way to make friends at the track!

- **Chassis tweak.** Your vehicle should

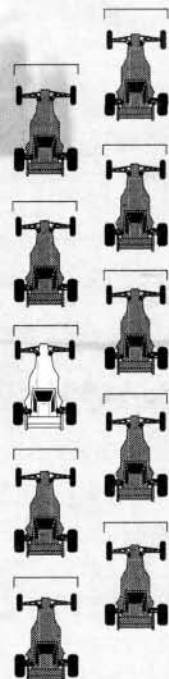


Figure 2a

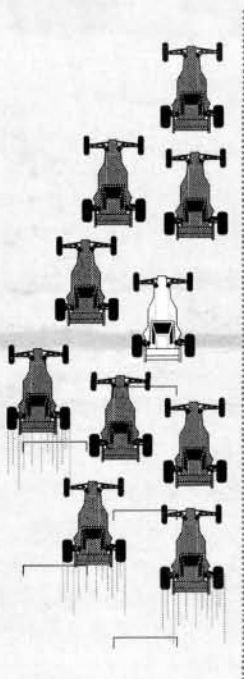


Figure 2b

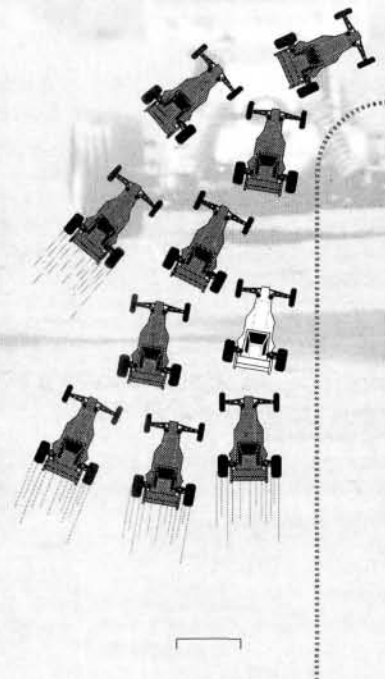


Figure 2c

This is an ideal start, if there is such a thing, from the middle of the grid. Work your way to the inside of the track as soon as you can (without interfering with other cars). Once you reach the inside, stay there; don't let another car get inside you. Watch out for the cars behind you as well as for crashes in front. This is by far the most difficult position to get a good start from.

accelerate in a straight line. The easiest way to check is to find a clean, flat section of smooth concrete, such as a sidewalk or garage floor. From a stop, give your car full throttle. If the car pulls to one side, the front tire on the side to which the car pulls has more weight on it. To correct the problem, either tweak

the chassis in the other direction, or, for cars with shocks, lower the spring collar slightly on the side to which the car pulled. Once you've made your adjustments, try the "punch-off" test again. Keep doing this until your vehicle accelerates in a straight line. Once your car accelerates straight, the rest of your

Mark Pavidis and Joel Johnson: Voices of Experience



Mark Pavidis



Joel Johnson

I asked the current 4WD off-road world champion, Mark Pavidis, and multi-national and world champ, Joel Johnson—arguably the best R/C driver ever—about their techniques for good starts. Both drivers participate in events for all scales and types of R/C car, but Mark mainly drives off-road, and Joel focuses on on-road. Here are their insights.

Q What is your general strategy to get a good start in a Main?

Mark: Pray before the race starts and ask Mike [Reedy] for his fastest motor! OK, seriously, I try to visualize where I am on the starting grid and go through the start mentally before I get on the drivers' stand. If possible, during qualifying, I watch who I think will be in the Main with me to see how they like to start. I'm fortunate to live in the same area as many of the top factory racers, so most of the local club races are like national events. This really helps in getting used to starting next to the other fast guys, and it's great practice for the big events. The most important thing is to get through the first turn clean, which seems almost impossible.

Joel: I don't have just one strategy for starts. It really depends where I am on the grid and whether the grid is staggered or straight. For a straight grid, if I'm on the pole, I obviously stab the throttle and try to get around the first turn before anyone else. If I'm somewhere in the second row through the next-to-last row,

my start depends on the people in front of me. This is by far the hardest starting position. If I'm in the back row, I usually delay slightly to see if I can pick my way through the first-turn mess. If the grid is staggered, then the starts are usually much easier, and they depend on your reflexes, as you have room directly in front of you to maneuver.

Q What is your least favorite starting spot on the grid?

Mark: The middle of the pack.

Joel: My least favorite place to start is on the outside anywhere off the front row—especially in the middle of the pack.

Q How important to your final position is a clean start?

Mark: It's the most important part of the race. You can't win if you're upside-down!

Joel: I feel that the start in a 4-minute race is very important. After all, the race is a sprint, and if you have to make up ground after a bad start, you run the risk of dumping your batteries or tangling with another car. The most positions can be gained at the start of the race if the start is executed properly.

Q If you can't start on the front row, say position one or two on a staggered grid, what is the next best place to start from?

Mark: Eighth or ninth, to the inside of the last row.

Joel: On a staggered grid, if I couldn't be on the pole, I would rather qualify third to protect the inside line in the first turn.

GET GOOD STARTS

strategy will be much easier.

Once I'm confident that my car will leave the line going straight, I try to focus on two things if I'm at the front of the grid—getting to the inside of the first turn and trying to "hide" my car as I go around it. I'm sure you've seen many starts in which the cars in the back overshoot the first turn and run into the side of the car in front of them. This is the problem that you'll avoid by "hiding" around the first turn.

"Hiding" around the corner simply means getting your car into the apex of the turn and out of the "line of fire" as quickly as possible. This can be accomplished only if you are all the way to the inside of the turn. It's important that you don't overshoot the first turn; stay on the power as long as you are able. Once you slow down, make a fast, sharp turn, and get back on the power as soon as possible without getting too loose. The faster you get the back of your car around the turn, the better your chances of surviving the inevitable first-turn pileup. As long as you get around that first turn cleanly, you'll be able to put a lot of distance between your car and the cars at the bottom of the pile.

THE MIDDLE OF THE ROAD

Of all the starting places, I most dislike the middle of the pack. Starting there is like getting caught between elevator doors. You have to watch out for the cars behind you as well as those in front. The best advice I can give you for middle starts is to drive defensively. As you learned in driver's ed, watch out for the others on the road at all times. The sooner you can get to the inside of the first turn, the better off you'll be. You'll need to take it easy when the horn goes off. Don't take off too aggressively and run into the car in front of you. Remember to watch out for the cars behind you. If they look like "incoming missiles" in the first turn, get out of the way. They will probably overshoot the turn and crash anyway! Hold back a little, and work your way to the inside. Be careful not to cut off any cars that might be sneaking up beside you. If you see cars starting to tangle, try to steer clear of them.

If you're in the second row or near the

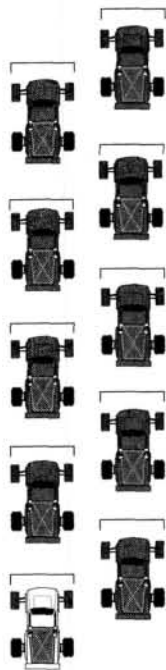


Figure 3a

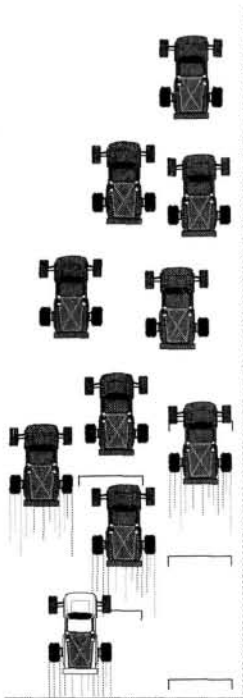


Figure 3b

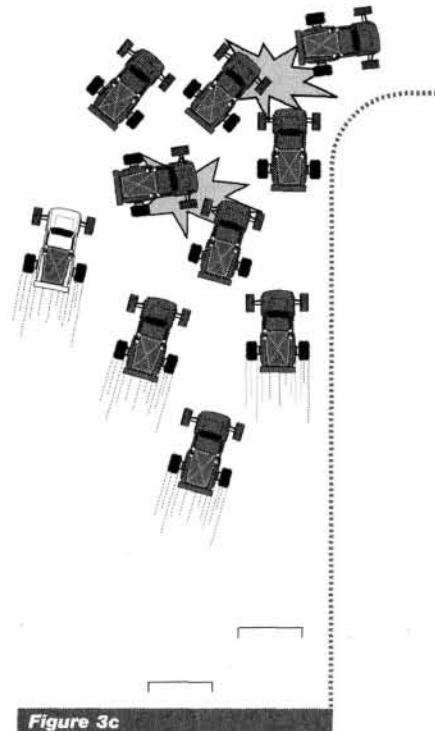


Figure 3c

Figure 3. When you start from the back of the grid, be patient; wait to see what happens in front. To drive around crashes, you'll often have to move to the outside. The more crashes you can avoid, the more cars there will be behind you.

front of the pack, it's still important to get around the first turn and out of the way as soon as possible. You need to be extra careful to avoid running into the cars in front of you, though. If you are near the front of the pack in the first turn and get tangled up, you'll wind up at the bottom of a huge pileup. By the time the turn marshal gets to your car, the leaders will be long gone.

BACK, BACK, WAY BACK

Many racers get depressed when they think about starting from the back of the pack. In my opinion, this is the easiest place to start from. It's not as if there are 30 to 50 cars in the field; there are only 10. If you can get around the first turn without driving into another car, the farthest you can be is 12 feet or so behind the leader. I've seen many races won by drivers who started eighth, ninth and even 10th on the grid. Kinwald won a world championship from the eighth position in all three Mains.

The key to successful starts from the back of the pack is being observant. Just drive around the crashes—and, trust me, there will be crashes. Assume that there are two crashes each involving two cars; if you can avoid those, even if you started 10th, you'll already be in sixth place. See how easy this is?

If you are toward the back of the start-

ing grid, it is much less important to get to the inside of the first turn than it is if you start from other parts of the grid. Sometimes, it's necessary to move to the outside to steer and avoid a huge pile of cars. Again, just try to survive the first few turns without becoming tangled. If you stay clean, you'll be toward the front of the pack, even from 10th on the grid.

CLOSING THE DEAL

Once you have determined your first-turn strategy, rehearse the start in your head a few times before you get up on the drivers' stand. It's important to be comfortable with your procedure when the horn sounds and all 10 cars are charging toward the same 6 square feet of track. As long as you get around the first turn without a collision, you should be close to the leaders. At that point, concentrate on catching them.

Remember, nobody ever recalls who leads the first lap of a race. Take your time, and be patient in traffic. Whenever your vehicle gets hung up with another vehicle or with part of the track, the leaders stretch their lead. As long as you stay out of trouble, you should be within striking distance near the end of the race. This is when it counts! This is where the race is won, not in the first turn. ■

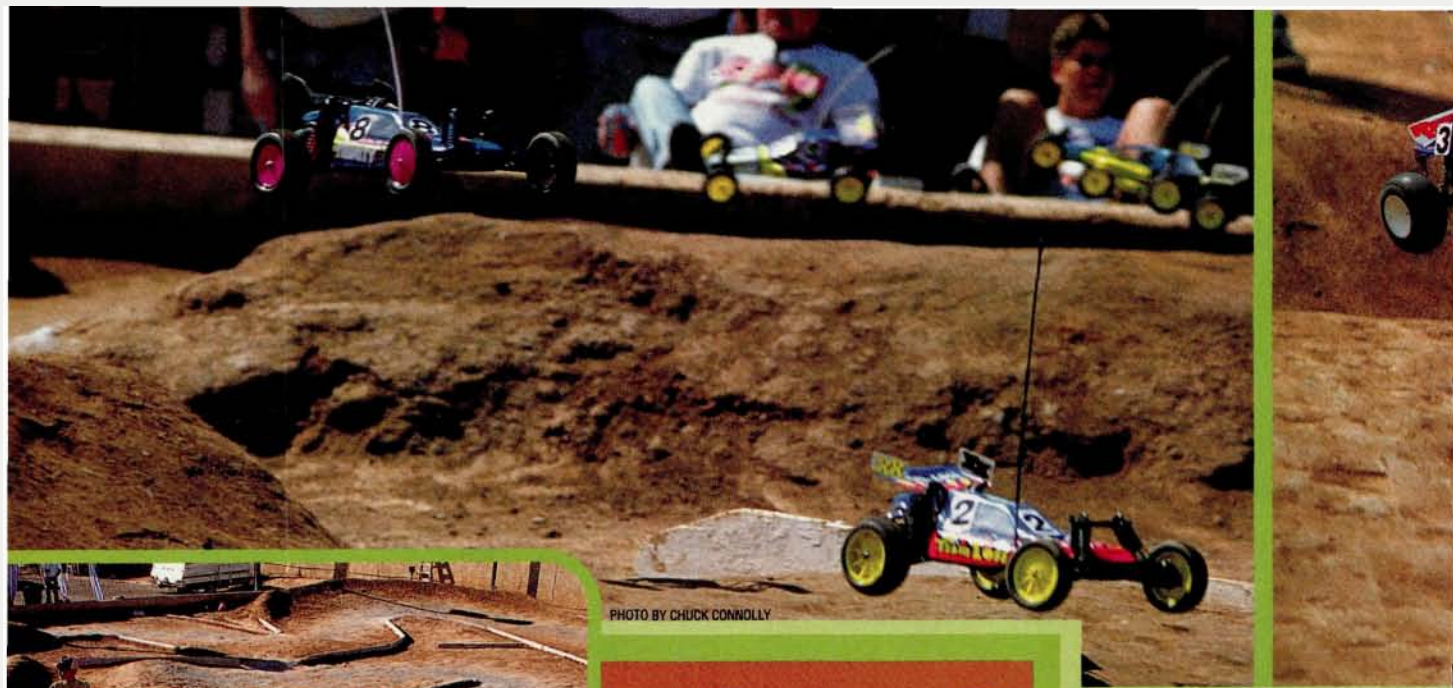
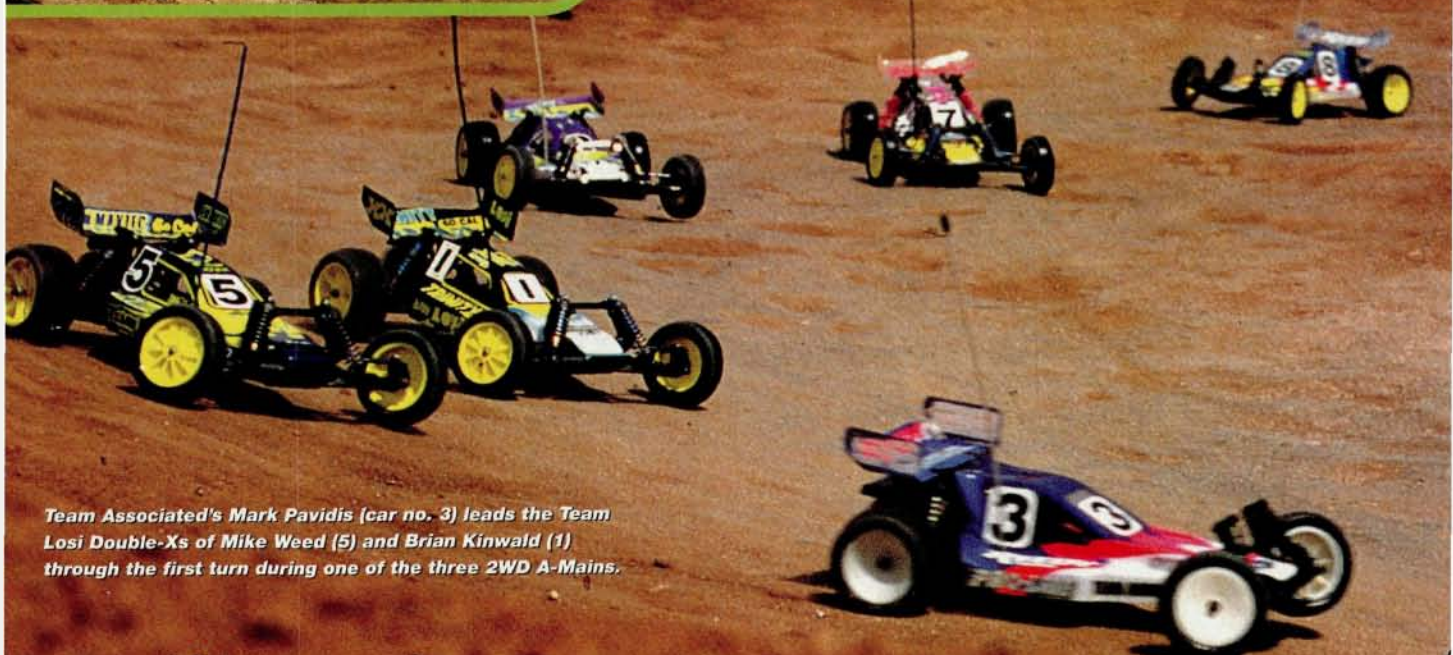


PHOTO BY CHUCK CONNOLLY

duel

in the

The Scottsdale R/C Speedway in Tempe, AZ, features a hard-packed track that remained consistent through three days of nonstop racing action.



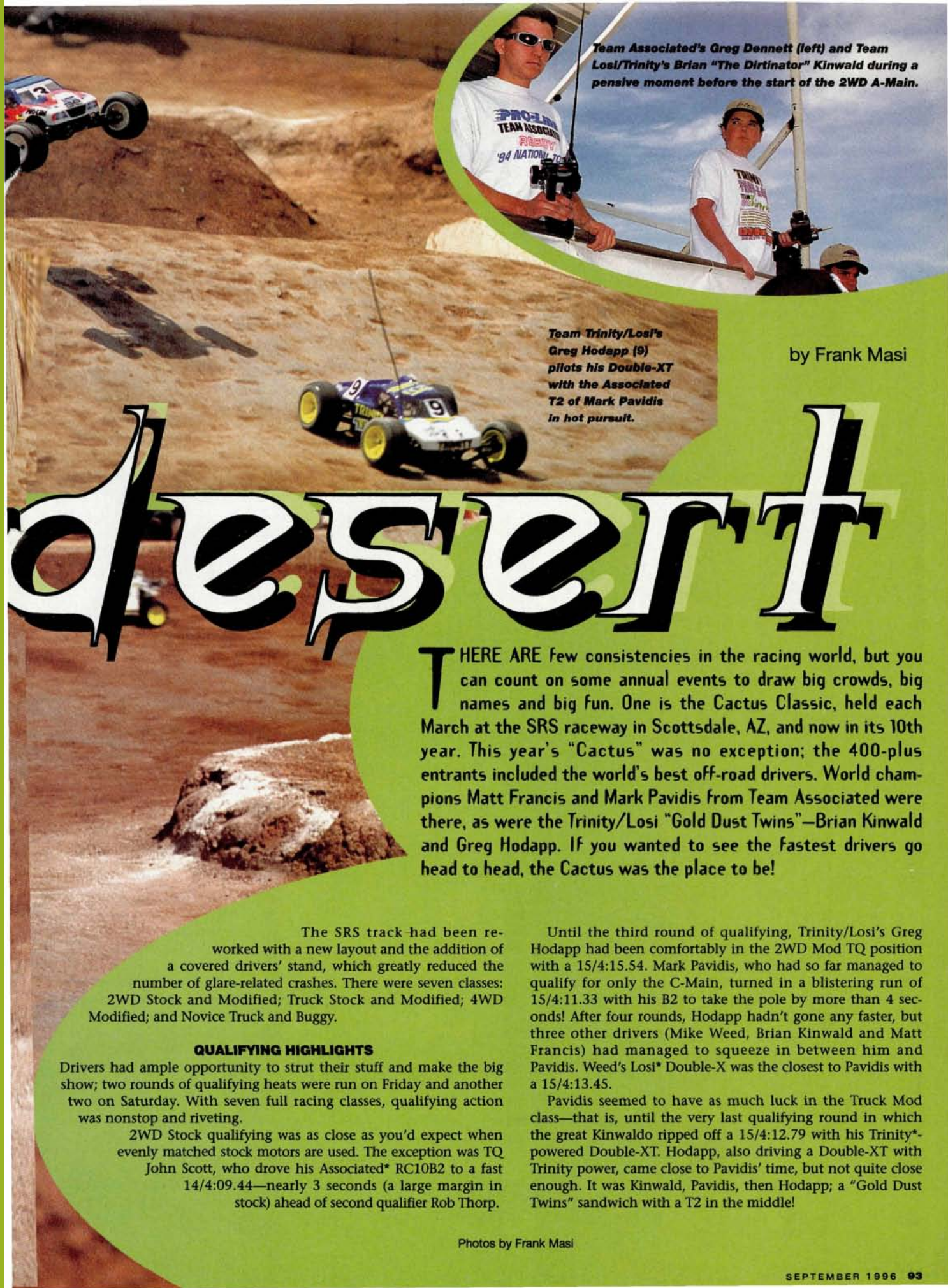
Team Associated's Mark Pavidis (car no. 3) leads the Team Losi Double-Xs of Mike Weed (5) and Brian Kinwald (1) through the first turn during one of the three 2WD A-Mains.

10th annual cactus classic

sponsored by

PRO-LINE

Radio Control
CAR ACTION



Team Associated's Greg Dennett (left) and Team Losi/Trinity's Brian "The Dirtinator" Kinwald during a pensive moment before the start of the 2WD A-Main.

Team Trinity/Losi's Greg Hodapp (9) pilots his Double-XT with the Associated T2 of Mark Pavidis in hot pursuit.

by Frank Masi

desert

THERE ARE few consistencies in the racing world, but you can count on some annual events to draw big crowds, big names and big fun. One is the Cactus Classic, held each March at the SRS raceway in Scottsdale, AZ, and now in its 10th year. This year's "Cactus" was no exception; the 400-plus entrants included the world's best off-road drivers. World champions Matt Francis and Mark Pavidis from Team Associated were there, as were the Trinity/Losi "Gold Dust Twins"—Brian Kinwald and Greg Hodapp. If you wanted to see the fastest drivers go head to head, the Cactus was the place to be!

The SRS track had been re-worked with a new layout and the addition of a covered drivers' stand, which greatly reduced the number of glare-related crashes. There were seven classes: 2WD Stock and Modified; Truck Stock and Modified; 4WD Modified; and Novice Truck and Buggy.

QUALIFYING HIGHLIGHTS

Drivers had ample opportunity to strut their stuff and make the big show; two rounds of qualifying heats were run on Friday and another two on Saturday. With seven full racing classes, qualifying action was nonstop and riveting.

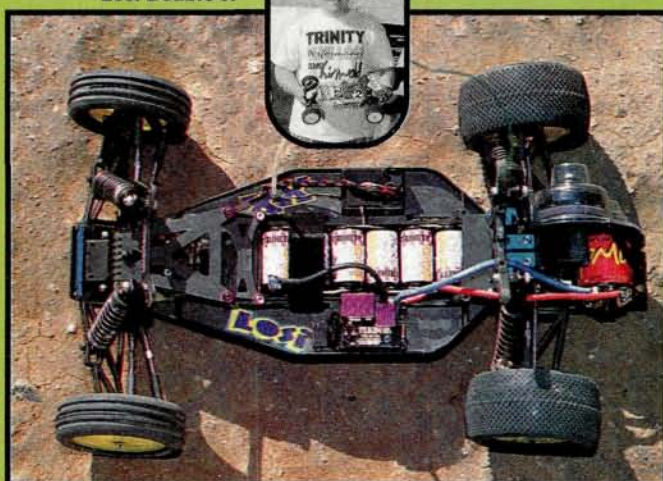
2WD Stock qualifying was as close as you'd expect when evenly matched stock motors are used. The exception was TQ John Scott, who drove his Associated* RC10B2 to a fast 14/4:09.44—nearly 3 seconds (a large margin in stock) ahead of second qualifier Rob Thorp.

Until the third round of qualifying, Trinity/Losi's Greg Hodapp had been comfortably in the 2WD Mod TQ position with a 15/4:15.54. Mark Pavidis, who had so far managed to qualify for only the C-Main, turned in a blistering run of 15/4:11.33 with his B2 to take the pole by more than 4 seconds! After four rounds, Hodapp hadn't gone any faster, but three other drivers (Mike Weed, Brian Kinwald and Matt Francis) had managed to squeeze in between him and Pavidis. Weed's Losi* Double-X was the closest to Pavidis with a 15/4:13.45.

Pavidis seemed to have as much luck in the Truck Mod class—that is, until the very last qualifying round in which the great Kinwald ripped off a 15/4:12.79 with his Trinity*-powered Double-XT. Hodapp, also driving a Double-XT with Trinity power, came close to Pavidis' time, but not quite close enough. It was Kinwald, Pavidis, then Hodapp; a "Gold Dust Twins" sandwich with a T2 in the middle!

Photos by Frank Masi

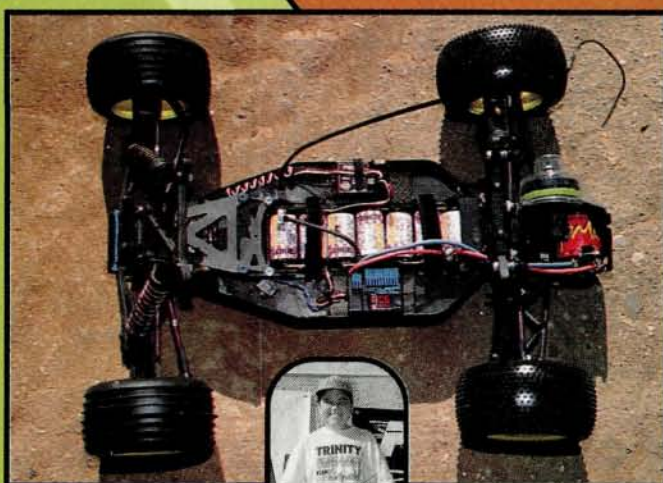
Greg Hodapp's 2WD
Modified winning Team
Losi Double-X



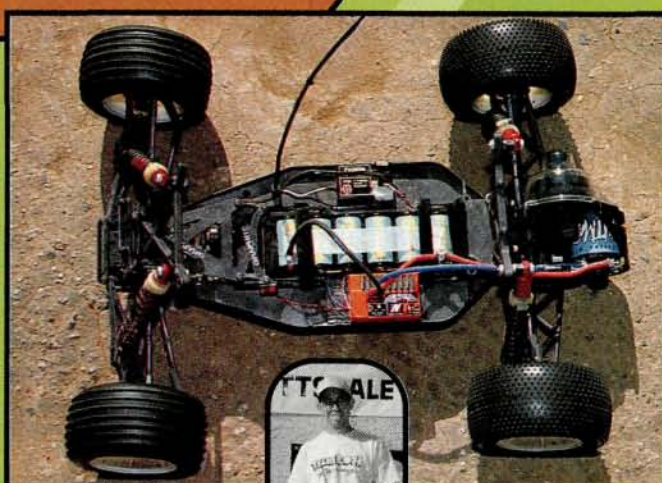
Alex Guerrero's 4WD
Modified winning
Yokomo YZ-10



cactus classic winners' cars



Brian Kinwald's Truck
Modified winning Team
Losi Double-XT



Richard Trujillo's Truck
Stock winning Team Losi
Double-XT

R/C Objets d'art

It's not how fast you get there, but how good you look while doing so. That's the motto of the serious concours entrant. These R/C'ers spend much more time making sure that their paint jobs are perfect than deciding whether they're using the right shock oil. At this year's Cactus Classic, concours judging was difficult;



there were so many good-looking entries that picking a winner was like trying to find the perfect snowflake. Along with Todd Mattson of Pro-Line and SRS's own Mike Dolan, I was fortunate to be one of the judges this year.

- First place went to Shawn Shadowd for his incredibly detailed Team Losi Double-XT truck. Shawn used a unique blend of original art, computer-printed images and conventional Lexan

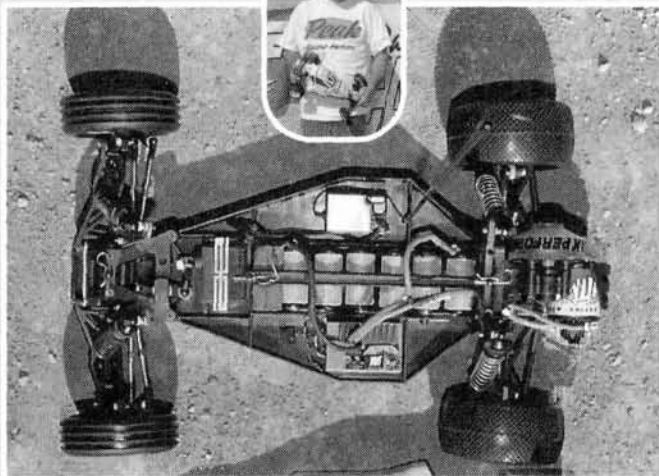


paint to create the "All Roads Lead to the Cactus Classic" truck.

- The runner-up award was given to Arizona's own "flyin'" Ryan Maifield for his very stylish Team Associated RC10T2 truck. Ryan's Dad Perry painted it and created the detailed interior, and Mom Tanya made the "Mr. Cactus" mascot.
- Honorable mention went to Andrew Robinson for his cool-looking Team Losi GTX gas truck. Although it was not eligible to race, Andrew's reptilian paint scheme was too creative to be overlooked.



**John Scott's 2WD Stock
winning Team
Associated RC10B2**



Alex Guerrero, fresh from a second-place finish in 2WD Mod down at the Florida Winter Champs, was the elite racer in 4WD Mod. Guerrero's Yokomo* YZ-10 "world's special" was clearly dominant with a 15/4:13.53. The next closest 4WD was Ryan Maifield's with a 14/4:06.17. It looked as if nothing short of a natural disaster would prevent Guerrero from walking away with the win in the Main.

MAIN EVENT ACTION

Truck Mod and 2WD Mod—the two "big" classes, i.e., the ones in which most of the factory drivers ran—followed a triple A-Main format. This meant that each driver in these classes had three chances to win and that luck played less of a role. The remaining classes—2WD and Truck Stock, 4WD Mod and Truck and Buggy Novice—ran traditional, single A-Mains.

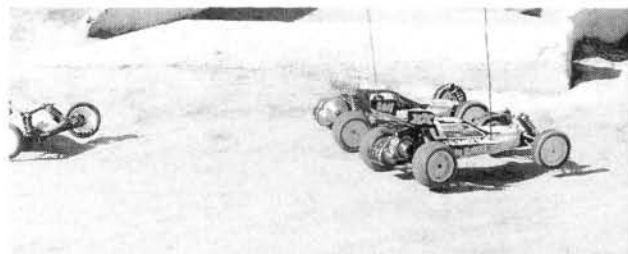
• **2WD Stock.** Top qualifier John Scott had it anything but easy during this Main; Jimmy Babcock's Double-X and Rob Thorp's B2 were hot on his heels. Scott maintained his composure; he won the Main and actually improved on his TQ time by 1 second. Babcock followed 2 seconds behind with Thorp trailing him by less than 1 second.

• **Truck Stock.** This Main was one of the most exciting. TQ and Losi team manager Richard Trujillo led this one from start to finish, but his win was anything but easy. Throughout the entire 4 minutes, Trujillo had to con-

away, waiting for a mistake from the leader. At the finish, it was Trujillo with a 14/4:07.14 and Caley, then Erchinger (14/4:09.48 and 14/4:12.36 respectively).

• **2WD Mod.** Before the event, Team Trinity/Team Losi's Greg Hodapp confided

...the two "big" classes, i.e., the ones in which most of the factory drivers ran—followed a triple A-Main format. This meant that each driver in these classes had three chances to win and that luck played less of a role.



Brian Kinwald goes door-to-door with world champion Matt Francis.

tend with the Losi trucks of Billy Caley and Ethan Erchinger, which were never more than one turn

in me that he intended to repeat his performance at last year's Cactus—total domination in 2WD Mod. Although he didn't dominate qualifying, the Mains were all his; he took advantage of a mistake by Mark Pavidis to win the first Main, then he backed it up with another win in the second one to clinch the overall win. Hodapp then enjoyed the luxury of sitting out the third Main to watch the remaining players fight it out for second.

Hodapp's Trinity/Losi teammate, Brian



Action over the doubles as Brian Kinwald gets "crossed-up."

A More Narrow Field

Since the near disappearance of Traxxas and Kyosho teams from competitive off-road electric racing, we rarely find any other make of vehicle in the pits than Losi and Associated (aside from the 4WD class, of course, in which the field is more "international" by nature).

So where are the other kit manufacturers? Kyosho certainly has made a name for itself in off-road: an Ultima won the 2WD IFMAR World Championships in '87, and a Lazer ZX-R won the ROAR Off-Road Nationals in '91. Yet today, you rarely see a Kyosho electric buggy or truck at a race.

And what of Traxxas? The company's racing buggy—first called the TRX-1, then updated to the TRX-3 and TCP variations—was quite a good performer. During the early '90s, team drivers such as Rick Vehlow were quite a force to be reckoned with. Traxxas has since discontinued its racing buggy, but it still produces the SRT racing truck.

Will we see more players in the future? Possibly. Don't rule out Kyosho. At the '95 IFMAR Worlds, prototypes of a new Lazer 4WD buggy made quite a splash (two made the final). Also, Kyosho is rumored to be testing a new 2WD racing buggy, but no official information has been released. Traxxas seems to be concentrating more effort on developing products for the lucrative entry-level market.

Keep your eye on Schumacher as well. Although its products seem more popular in Europe, its CAT 2000 4WD and Cougar 2000 2WD buggies have very interesting and effective designs.



Schumacher Cat E.C.



Traxxas TCP

2WD STOCK

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	1	John Scott	Assoc.	Peak	Orion	Novak	Airtronics	Assoc.	Losi/Pro-Line	Johnny Juice	24/81
2	3	Jimmy Babcock	Losi	Maxtec	Maxtec	Novak	Airtronics	Jammin	Losi/Losi	N/A	18/84
3	2	Rob Thorpe	Assoc.	Reedy	Orion	LRP	KO	Assoc.	Losi/Pro-Line	Assoc.	24/81
4	9	Phillip Atondo	Losi	Motor Man	Pro-Match	Novak	Airtronics	Jammin	Losi/Losi	N/A	24/84
5	10	Wes Kasper	Losi	Trinity	Trinity	Tekin	Airtronics	Jammin	Losi/Losi	None	24/84
6	7	Kurt Busch	Losi	Matrix	Pro-Match	Tekin	Airtronics	Losi	Losi/Pro-Line	None	23/84
7	6	Brad Niblecink	Assoc.	Reedy	Reedy	Novak	Airtronics	Assoc.	Pro-Line/Pro-Line	Assoc.	23/81
8	4	Chad Bradley	Assoc.	Race Prep	Race Prep	LRP	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	25/81
9	5	David Paul	Assoc.	Extreme	World Class	Tekin	Airtronics	Assoc.	Losi/Losi	Trinity	23/81
10	8	Jerry Walter	Losi	Race Prep	Ballistic	Novak	Airtronics	Sepultura	Losi/Losi	Fear Factory	22/86

4WD MODIFIED

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	10	Alex Guerrero	Yokomo	Peak	Orion	Novak	Sanwa	Yokomo	Losi/Pro-Line	None	N/A
2	2	Ryan Maifield	Kyosho	Peak	Orion	Novak	Futaba	A&L	Pro-Line/Pro-Line	None	21/96
3	6	Frank Masi	Predator	Trinity	Trinity	Novak	Airtronics	Predator	Pro-Line/Pro-Line	Assoc.	19/70
4	4	Jeff Roe	Schumacher	Maxtec	Pro-Match	Tekin	Airtronics	Schumacher	Pro-Line/Pro-Line	None	18/89
5	7	Patrick See	Schumacher	Peak	Orion	Novak	Futaba	Schumacher	Losi/Losi	None	14/95
6	9	Jay Neill	Yokomo	Peak	ESP	Tekin	Airtronics	Yokomo	Losi/Losi	None	16/87
7	5	Matt Lauerma	Yokomo	Maxtec	Trinity	Novak	Airtronics	Yokomo	Pro-Line/Losi	Trinity	16/87
8	3	Edward Mullen	Schumacher	Peak	Orion	Tekin	Airtronics	Schumacher	Losi/Losi	None	15/95
9	10	Hector Gonzalez	Schumacher	Peak	Orion	Novak	Airtronics	Schumacher	Pro-Line/Losi	None	18/95
10	8	Ken Hohn	Kyosho	Race Prep	Dble. Strike	Tekin	Futaba	A&L	Losi/Losi	None	20/96

TRUCK STOCK

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	1	Richard Trujillo	Losi	Peak	Orion	Novak	Airtronics	Losi	Losi/Losi	None	23/88
2	3	Billy Caley	Losi	Race Prep	N/A	Tekin	Airtronics	Losi	Losi/Pro-Line	Trinity	22/88
3	6	Ethan Erchinger	Losi	Peak	Orion	Novak	Airtronics	Losi	Losi/Losi	None	N/A
4	2	Albert Guardado	Losi	Peak	Orion	Novak	Airtronics	Losi	Losi/Losi	Jack's*	24/88
5	4	Kurt Busch	Assoc.	Integy	Pro-Match	Tekin	Airtronics	Assoc.	Losi/Pro-Line	None	21/85
6	9	Thomas Corpuz	Losi	Extreme	World Class	Tekin	Airtronics	Jammin	Losi/Losi	Assassin	23/87
7	7	Chuck Erickson	Losi	Extreme	Rossi	Tekin	Airtronics	Losi	Losi/Losi	N/A	23/88
8	5	Brandon Aymar	Losi	Peak	Orion	Tekin	Airtronics	Losi	Losi/Losi	N/A	22/88
9	10	Randy Poh	Assoc.	Peak	Orion	Tekin	Airtronics	Assoc.	Pro-Line/Pro-Line	None	24/90
DNS	8	Chris Stahl									

*Jack's Secret Sauce

2WD MODIFIED

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	5	Greg Hodapp	Losi	Trinity	Trinity	Tekin	Airtronics	Losi	Losi/Pro-Line	Trinity	19/84
2	3	Brian Kinwald	Losi	Trinity	Trinity	LRP	Airtronics	Jammin	Losi/Losi	Trinity	19/84
3	2	Mike Weed	Losi	Maxtec	Ballistic	Novak	KO	Losi	Losi/Pro-Line	None	18/84
4	1	Mark Pavidis	Assoc.	Reedy	Reedy	LRP	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	19/81
5	10	Richard Saxton	Assoc.	Reedy	Reedy	Novak	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	N/A
6	8	Brent Thielke	Losi	Race Prep	Orion	Novak	Airtronics	Jammin	Losi/Losi	None	22/84
7	9	Rick Hohwart	Assoc.	Peak	Orion	Novak	Futaba	Assoc.	Losi/Pro-Line	None	20/81
8	4	Matt Francis	Assoc.	Reedy	Reedy	LRP	Airtronics	Assoc.	Pro-Line/Pro-Line	Assoc.	19/84
9	6	Jim Gard	Losi	Race Prep	Ballistic	Tekin	Airtronics	Jammin	Losi/Losi	Homemade	21/84
10	7	Greg Dennett	Assoc.	Reedy	Reedy	LRP	Airtronics	Assoc.	Pro-Line/Pro-Line	Assoc.	20/87

TRUCK MODIFIED

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	1	Brian Kinwald	Losi	Trinity	Trinity	LRP	Airtronics	Jammin	Losi/Losi	Trinity	18/88
2	3	Greg Hodapp	Losi	Trinity	Trinity	Tekin	Airtronics	Losi	Losi/Pro-Line	Trinity	18/88
3	7	Matt Francis	Assoc.	Reedy	Reedy	LRP	Airtronics	Assoc.	Pro-Line/Pro-Line	Assoc.	19/87
4	5	Greg Dennett	Assoc.	Reedy	Reedy	LRP	Airtronics	Assoc.	Pro-Line/Pro-Line	Assoc.	19/84
5	2	Mark Pavidis	Assoc.	Reedy	Reedy/Orion	LRP	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	20/87
6	8	Jimmy Babcock	Losi	Maxtec	Maxtec	Novak	Airtronics	Jammin	Losi/Losi	None	18/87
7	4	Rick Hohwart	Assoc.	Peak	Orion	Novak	Futaba	Assoc.	Losi/Pro-Line	None	18/87
8	6	Mike Weed	Losi	Maxtec	Ballistic	Novak	KO	Losi	Losi/Losi	None	19/88
9	9	Brian Robinette	Losi	Maxtec	Maxtec	Tekin	Airtronics	Jammin	Losi/Losi	Homemade	19/87
10	10	Alex Guerrero	Losi	Peak	Orion	Novak	Sanwa	Jammin	Losi/Pro-Line	None	N/A

A League of Their Own

It's rare these days to find classes for novice drivers at local clubs. Rarer still do we find provisions for beginners at large events. The Cactus Classic is one big race that hasn't forgotten novices. This year, newcomers to R/C racing were able to compete in both 2WD Novice Buggy and Truck. Here are the results:

2WD NOVICE

The three fastest in this class—Kyle Kendrick, Jeremy Kopp and Brian Valles—pulled away from the pack and battled closely for the duration of the 4-minute event. Kendrick crossed the finish line first with the only 13-lap run, followed by Kopp and Valles in second and third respectively.

This was Kyle's first race after a very long absence from R/C. He was glad to be back, to say the least!



Fin.	Qual.	Driver
1	5	Kyle Kendrick
2	2	Jeremy Kopp
3	4	Brian Valles
4	9	Gilbert Lazano
5	8	Robert Young
6	10	Evan Wilensky
7	7	Eric Reaves
8	1	Jim Morgan
9	6	Robert Maggard
10	3	Cher Gervais

TRUCK NOVICE

Female R/C'ers, rejoice! Last year, Traci Howard won in this class, and Cher Gervais apparently vowed to continue the trend at this year's Cactus! Gervais beat the likes of Rudi Schmek and Jeremy Kopp to the finish line with a fast

12/4:11.61. Good goin', Cher! (Her husband, Gary, finished in the B-Main).



Fin.	Qual.	Driver
1	3	Cher Gervais
2	7	Rudi Schmek
3	2	Jeremy Kopp
4	8	Richard Rice
5	9	Paul Skelton
6	6	Robert Maggard
7	1	Rich Anderssohn
8	5	Robert Goldsmith
9	4	Fred Markham
DNS	10	Bill Layfield

Kinwald, stepped it up after a mediocre fifth place in the first round to place second in round two, then he won round three. This placed Kinwald second overall. Team Losi's Mike Weed rounded out a 1-2-3 Losi sweep, followed by top qualifier and Associated "works" driver Pavidis.

• **4WD Mod.** As expected, Alex Guerrero holeshot and never looked back. His Yok' was dialed! Following Alex, but not that closely, were Ryan Maifield's Kyosho* Lazer, the Schumacher* of Jeff Roe (of Pro Match Batteries) and, believe it or not, my Tenth Technology* Predator. Guerrero set



Kinwald (1) leads Mike Weed over the doubles.



Matt Francis (6) tries to put an inside move on Kinwald (1).

a blistering pace and crossed the line with a very fast 15/4:18.9. Maifield maintained his second-place position, and a last-corner bobble on Roe's part allowed me to sneak into third (sorry Jeff!).

• **Truck Mod.** After a Hodapp/Kinwald finish in 2WD, what would you expect but a Kinwald/Hodapp finish in Truck Mod? In the first round, Kinwald turned in an absolutely ballistic run with 15/4:07.47 (which, I believe, was the event's fastest). Brian's Team Losi Double-XT truck burned up the track again in the second round to clinch the overall win. During the first two rounds, Hodapp finished as runner-up to Brian to secure the second overall spot. Buggy world champion Matt Francis proved that he can also drive trucks. Consistency netted Matt and his Associated RC10T2 the third position overall. Mark Pavidis rallied in round three, crossing the line in first and placing in fourth in overall points for the class.

A CLASSIC EVENT

The Cactus Classic is like fine wine and Sophia Loren; it just gets better with age. Everyone enjoyed the laid-back racing action and the beautiful Arizona weather. Thanks must be given to Pro-Line for their continued sponsorship and to Scott, Jim, Mike and everyone at SRS for putting on such a successful race.

*Addresses are listed alphabetically in the Index of Manufacturers on page 176. ■



World champions Mark Pavidis (left) and Matt Francis (right) flank Peak Performance's Rick Hohwart and local racer Jim Gard.

HOW TO

Get Started in R/C

Drag Racing

by Mike Ogle



FROM RUN-WHATCHA-BRUNG TO
TOP FUEL ELIMINATOR, IT'S
ALL FOR THE NEED OF
SPEED



WHAT'S THE first thing you did when you took your very first R/C car out for a spin? If you were like most of us, you wanted to see just how fast it would go, so you grabbed a handful of throttle and went screaming down the longest straightaway you could find. Yeowww! The thrill of that initial speed rush is probably one of the things that really hooked you on R/C racing.

Well, for many of us, that need for speed has become an addiction, laced with Walter Mitty-esque fantasies of being the next John "Brute" Force or Don "Snake" Prudhomme hurtling down our mind's own quartermile at more than 300mph. For the thousands of faithful followers of this uniquely American motor sport—National Hot Rod Association (NHRA) Drag Racing, as seen on TNN's "NHRA Today" every Sunday—nothing in the R/C world brings that excitement home like R/C drag racing.

R/C drag racing satisfies the very basic desires of many R/C thrill-seekers. Hot-rod enthusiasts are fascinated to see a scale '29 roadster squaring off against a Dodge Avenger pro stock, or a sleek rail-type dragger side by side with a '55 Chevy door-slammer. No matter which kind of cars you like, from nostalgic classics to futuristic streamliners, there's a place for them in competition at the drags. Bodies from Bolink* ('55 Chevys to '32 Deuce coupes),



A pre-race lineup of draggers at a Northern California Drag Racing Association (NCDA) race in the San Jose area.



An original West Coast terror, Roger Rose's flamed 20-cell dragger was one of the first cars in the 1.70s.



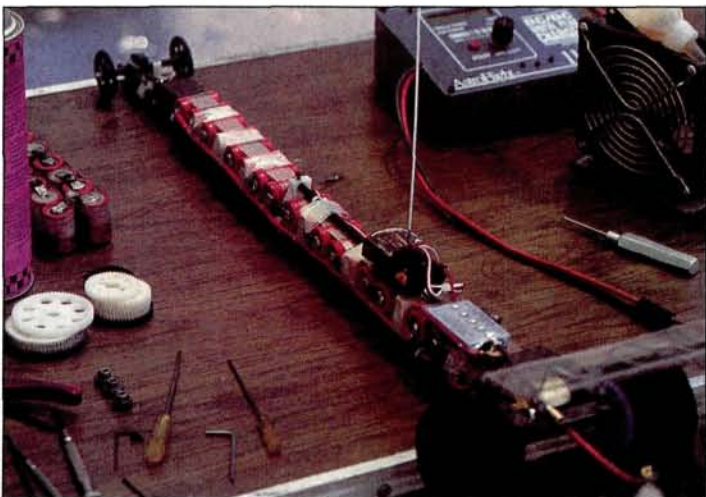
This guy definitely remembers the nostalgic fuel-altered days, as shown by his unique "Old Yeller" drag coupe. Well, maybe not.

Parma* (Anglias, highboys, hemi coupes, hemi 'Vettes and their gorgeous new '37 Chevy Pro Mod), Protoform* ('95 Firebird funny cars and top fuel dragsters), Andy's* (Olds pro stock and dragsters), Dahm's* (pro stockers, Phantom drag coupe) and more are at home on the strip. Any R/C car can drag race, and almost all R/C'ers can master navigating a straightaway in just a few minutes. People (even first-time R/C'ers) have actually bought cars featuring R/C drag components in the morning and competed in races that evening.

You can start with the entry-level classes and move up from standard 6-cell-powered, stock-motor cars to the 8- to 10-cell pro stocks, dragsters and funny cars, all the way up to the 16- to 20-cell top fuel draggers, where the truly warped minds of R/C reside. This is R/C racing in the extreme, where the 2½-foot-long, cobalt-magnet-motor missiles travel the 132-foot course in less than 2 seconds and fly across the finish line at real speeds of more than 80mph. That's right: this is not a guess or a bogus calculated lap time; it's real, dual-photocell-timed speed.

GET STARTED

You may be lucky enough to live near a hobby shop with a drag strip or a timing system that can be set up for parking lot drags. Quite a few of these weekend-warrior programs have popped up all over using single- and dual-lane timing systems by Race America, or they've built their own timing systems using infrared burglar-alarm photocells wired to electronic stopwatches. If you don't have a track nearby with a proper timing system, you and your buddies can just find an open stretch of good, flat asphalt, mark off 132 feet (a 1/10-scale quarter-mile) and station someone at the end with a stopwatch to get ETs, or elapsed times. To run eliminations or side-by-side races, you can station someone at the finish line with a flashlight to act as the starter. Line up your cars side by side, and look downtrack at the starter's light. When he clicks it on, react as quickly as you can (don't jump the gun or it will be *really* obvious!), and race to the finish line.



This car seems to be made up entirely of batteries. There's enough energy stored here to light up a small town!

CAR SETUPS

TIRES Because your primary concerns in preparing any type of car for drag racing are rolling resistance, stability and weight, the tires should be among the first components you change. Run rear tires that are as soft as you want or need to obtain maximum traction. Drag racers all have their favorite witch's brew traction compounds, ranging from home-brewed transmission fluid and who-knows-what gunk to commercially available compounds such as Fine Design's* Tire Bite and Stick-It traction compounds used for slot-car racing. Conversely, for minimal rolling resistance, run front tires that are as hard and narrow as you can find. Try putting a pair of old Blues or Oranges on the tire truer and narrowing them to a 1/2-inch or less. The pro-level drag cars run little, skinny, machined "pizza-cutter" front wheels with just a common neoprene rubber O-ring for a tire.

BEARINGS To further fight rolling resistance, be sure to have good, clean bearings throughout. This may seem like a little thing, but if you were to run the same car with bushings, then with cruddy bearings, then with clean bearings on a pro-level timing system, you would actually be able to see a measurable performance difference among the three. The clean bearings would prevail, of course. We're talking hundredths of a second here, but the clock sees and tells all.

BALANCE To ensure straight-line stability and launches, be sure that the left and right sides of the chassis balance. The standard T-bar/tweak screw setup enables you to set your tweak at neutral, though it should be noted that a T-bar is most properly used to re-center the rear pod of a turning car. So its only possible use in drag racing may be for a little front-to-rear flex on traction-questionable tracks, but pro-level drag cars seldom use them. Likewise for differentials; a diff is a great idea for allowing one rear tire to rotate at a different speed from the other while turning. But serious drag cars usually feature a locked diff or a spur-to-wheel, direct-mount drive hub such as those available from Lightz Products*, Lockmann Precision*, Barracuda* and Fine Design.

MOTOR A common misconception is that you need a very low-turn motor, such as a 7-, 8-, or 9-turn coat-hanger-wire motor, to go fast on the strip. These motors may produce a zillion rpm, but it's doubtful you'll ever see that top end in only 132 feet. These low-wind motors frequently just don't seem to "leave" quickly enough, even when geared very, very low. A better choice would be a 10- to 13-turn motor, preferably with rare-earth or cobalt magnets, for example, Fine Design's Cordite series, Twister's* cobalt drag motors (especially their 10-turn double), Point Blank's* rare-earth motors and Trinity's* new cobalt drag motors. Cars with more than a dozen cells are most often found with AstroFlight* samarium-cobalt motors, such as the 05-size Top Fuel 1 or their larger, beefier Top Fuel 2. These motors feature a unique, 7-pole, skewed-lamination armature, huge commutators and brushes that handle the high-amp currents with ease. Originally designed for 18- to 36-cell model airplanes, these monstrous motors require little maintenance, and they perform very consistently.

SPEED CONTROL For this, you can opt for any high-current, amp-delivering ESC, but especially recommended are Novak's* 928 (for eight to 28 cells), AstroFlight's 206 and Tekin's* 420 G2—the "105mph speed control." Yep, it did it; I saw it! If you're good with electronics, you can wire up a small servo and dual-microswitch on/off throttle setup. These ingenious little rigs also allow you to dial in a little automatic delay by backing off the servo with a click or two of the radio's throttle trim control.

HOW TO GET STARTED IN R/C DRAG RACING

In close contests, the starter can determine the winner.

HOW ABOUT GEAR?

Which equipment will you need to go draggin'? The normal car, 6-cell battery, transmitter and charger will be enough to get you going, especially if you already race an on-road or oval-style car. If you have an off-road car, you'll need to change over to a set of foam tires, at least in the rear, for traction on the asphalt. But if you want to modify an on-road pan car for drag racing, here are a few tips:

The first thing you should adjust isn't even on your car; it's on your transmitter. Dial out almost *all* of your steering. You won't be navigating any turns, and if you do need to make any midcourse adjustments, you want them smooth and gentle, not sudden. The whole idea in driving an R/C drag car is to scrub off as little speed as possible during the run by steering it downtrack. Try making repeated launches with your hand off the wheel until the car tracks straight with little or no correction.

THE TOTAL PACKAGE

There are, of course, a few drag-race car kits on the market. Pro stock, funny car

and dragger kits are available from Lockmann Precision, Lightz Products and Fine Design, and Parma offers the aforementioned '37 Chevy pro-mod. For the most part, these are rolling chassis and body kits that still leave you little more to do than just bolting them together, decaling the body and going. No manufacturers offer complete scale replicas of draggers that come with everything: motor, on/off speed control, body and proper decals to model a full-size NHRA circuit pro drag car. It's baffling to me that we can get superb kits based on DTM series racecars, F1 cars and European rally cars—*none* of which ever race in the United States—but no Eddie Hill or Joe Amato draggers, which are extremely popular and would probably be easy to produce. Some ingenious manufacturer will realize the potential here, I'm sure.

As we have often joked, R/C drag guys are different from most of the R/C world. We spend days and days detailing a car so that every component is polished and oiled just perfectly, then spend all day



This is what a drag-race car looks like after veering off course and hitting a cinder block at 85 mph. Not a pretty picture Huh?



under the hot sun for a grand total of 16 seconds of track time! We'll even be disappointed and kick furniture if we wind up with more than 18 seconds! And that's if we're having a good day. I've seen brand-new drag cars launch off the line on their first runs, only to seek and destroy the guardrail (and themselves) in a matter of less than 1 second! The more powerful cars have the most unbelievably spectacular wrecks you've ever seen. But if you're bored with goin' 'round and 'round and are looking for the next level in performance, get on the straight and narrow and try drag racing. It's the extremists' type of R/C!

**Addresses are listed alphabetically in the Index of Manufacturers on page 176.*

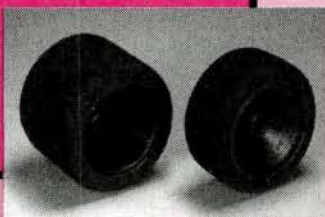


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Racing TIRES



In other BSR Racing news, the Neisinger Series Foam Tires are still being perfected for carpet and asphalt racing. We'll keep you posted on the latest developments. These exceptional new tires will retail for as low as \$19.95/pair for fronts and \$22.95/pair for rears.



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Track records fall at the Oval Masters Sugar Bowl Raceway. Rickey King breaks factory invitational track record. Brian Painter breaks stock track record. Steve Brown breaks amateur modified track record at Dominguey Hills California, Thunder Drome Race.

TECH HEAD

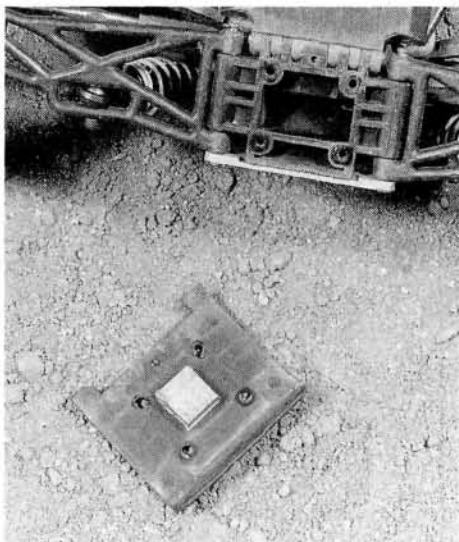
by Frank Masi

A Matter of Balance

VEHICLE WEIGHT and its distribution over the front and rear wheels is a significant tuning consideration. How and where weight is placed in your R/C vehicle can greatly affect its handling. Savvy racers have learned to use weight distribution as a tool. Here are a few tips to consider when you tune your vehicle for optimum handling.

GET THE LEAD IN!

Here's a little trick for Double-X and RC10B2 owners: to improve steering, add a small amount of lead weight to the



Adding lead weight to the front bulkhead of your buggy or truck will enhance its mid- to high-speed steering. But initial "turn-in" will be slightly diminished.

front end of your buggy. Factory drivers have been doing this for a long time, and you should give it a try, too!

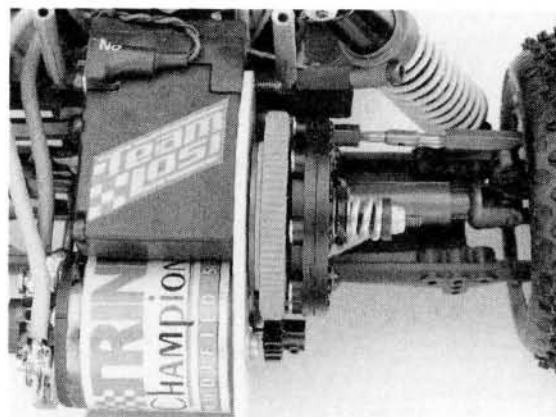
First, add 7 to 10 grams of lead to the inside of your buggy's front suspension bulkhead. There are two ways to attach this weight: stick a piece of self-adhesive lead to the inside of the front bumper, or simply place the lead inside the bulkhead with some foam to prevent it from rattling around.

I've tried this myself, and I noticed it increased both high- and low-speed steering, and the car seemed to land from jumps in a more "solid" manner. The only downside (depending on your definition of "downside") is that initial turn-in will be slightly diminished.

You can also vary the amount of weight to fine-tune steering. If you're worried about your car becoming too heavy with the additional weight, substituting graphite chassis and suspension parts is an effective, although expensive solution.

CHANGE YOUR SPUR GEAR

Your motor represents a fair percentage of your truck or buggy's total weight. By shifting the motor's position in relation to the chassis, you can affect your vehicle's handling. Changing to a smaller spur gear will move



Switching spur gear sizes is an easy way to gain and lose steering: a smaller spur gear moves the motor forward for increased steering; a larger gear moves the motor rearward for increased rear traction.

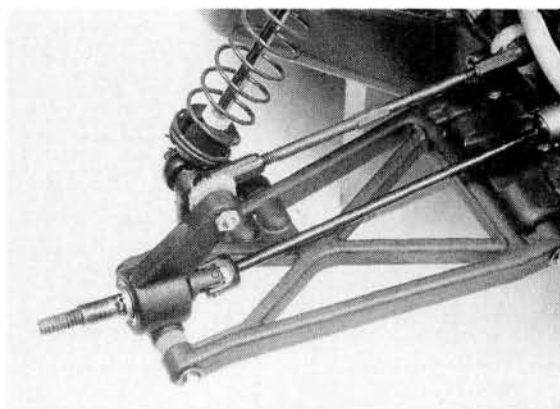
the motor's position forward, and that will generally provide more steering. Using a larger spur gear will place the motor more toward the rear of the chassis, and that will improve rear traction.

When you change spur-gear sizes, remember to recalculate your pinion/spur ratio to find the pinion-gear size that will most closely approximate your current gear ratio. For example, if you currently use an 88-tooth spur gear and a 21-tooth pinion in your buggy, you have a pinion/spur ratio of approximately 4.2:1 ($88 \div 21 = 4.2$). If you switch to an 84-tooth spur (which will move the motor forward, closer to the transmission), you'll need to use a 20-tooth pinion to get the same ratio.

STRETCH IT FOR STEERING?

During a visit to an online newsgroup, I became involved in a "debate" on the subject of weight distribution and steering. The discussion was centered on the tuning supplements that come with the RC10T2 and B2 kits; they tell us that moving the rear hub carriers rearward will increase steering by shifting more of the chassis' weight to the front wheels.

Admittedly, the idea of stretching the wheelbase and gaining steering seems contradictory, because a lengthened wheelbase usually means increased stability and slightly less responsive steering. After some thought, however, I came



Altering the position of the small hub spacer on the rear suspension of the Associated B2 and T2 changes the wheelbase and increases/decreases steering.

Wheelbase length and weight distribution.

Figure 1

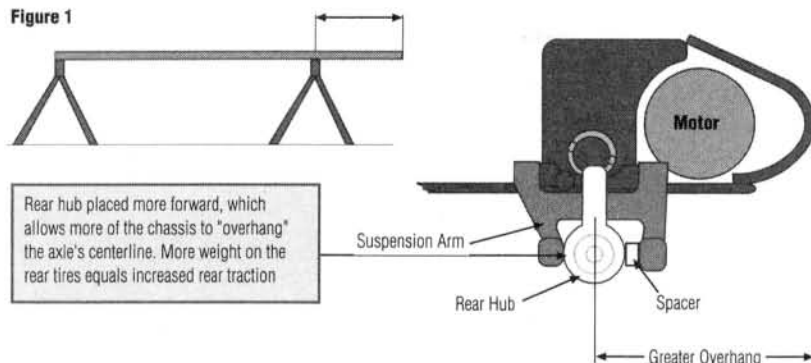
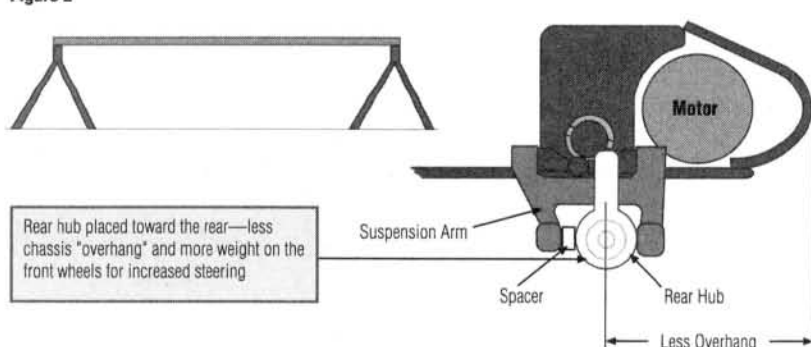


Figure 2



These diagrams show the effect of weight distribution. In the top diagram, the plank is placed flush with the front sawhorse and overhangs the rear sawhorse. Because part of the plank extends past the rear sawhorse, less of the plank's weight is placed on the front sawhorse, and more is placed on the rear. In the bottom diagram, both ends of the plank are flush with each sawhorse. As a result, the plank's weight is distributed equally over the two sawhorses. Think of your car's front axles as the front sawhorse and of its rear axles as the rear sawhorse. Changing the position of the rear axles affects weight distribution.

up with an analogy that I hope adequately describes this concept and how it works: imagine two sawhorses spanned by a wooden plank. One end of the plank lies flush with the outer edge of sawhorse 1, while the other end of the plank overhangs sawhorse 2 by 3 feet (see Figure 1). If you were to place a scale under each sawhorse, sawhorse 2 would weigh more than sawhorse 1. Because the plank hangs over, more of its weight is placed on sawhorse 2.

If you space the ends of the plank flush with the outer edges (Figure 2) of both sawhorses, the two scales will display equal weights; in other words, the weight of the plank will be distributed equally between the sawhorses, whereas before, more of its weight was centered on

sawhorse 2. The weight of the plank (and the sawhorses) remains constant; changing the points at which the weight of the plank is supported changes only the distribution of its weight.

By spacing the rear hubs of the B2 and T2 rearward, you're actually moving "sawhorse 2" rearward, diminishing the "plank's" overhang. In the case of the buggy and truck, the overhang is that portion of the suspension and chassis that is to the rear of the hub's centerline. Doing this distributes more of the vehicle's weight to the front wheels for increased steering. (Also, because there's less weight over the rear wheels, rear traction is slightly diminished.)

It's safe to assume, however, that the way in which a vehicle's wheel-

base is lengthened is at least as important as the wheelbase dimension itself. For example, elongating a vehicle's chassis to lengthen its wheelbase will not have the same effect as moving the rear hubs toward the back of the vehicle. Why? Because you've merely increased the length of the "plank" but haven't changed the position of the "sawhorses" that support it. Overall weight will increase because the chassis is longer, but the vehicle's weight distribution remains virtually unchanged.

The next time you're at the track, take some time to play around with your vehicle's weight distribution. You'll most likely be amazed at how subtle changes in weight distribution can affect your vehicle's handling.

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Whatta Concours lineup! Oh, wait: I think we're actually looking at L.A.'s Santa Monica Freeway at rush hour. Call the traffic 'copter!

Hobby Shack/Race Connection

Exhibition Race

R/C racing at the
Petersen Automotive
Museum by Mike Ogle





EVERY ONCE in a while, an idea comes around that's so good that you wonder why nobody thought of it before. This past April, one of those good ideas actually became a reality, when Hobby Shack*—the largest hobby retail chain on the West Coast—and promoter extraordinaire "Banana" Dan Moynihan of Dan's R/C Stuff*



joined forces to stage a one-day event at the Petersen Automotive Museum in West Los Angeles, CA. It featured more than a dozen major R/C manufacturers'

booths, a display of real racecars, a small, try-it-yourself R/C track and, of course, a full-blown R/C race on the upper level of the museum's immense parking structure.

For the racers and exhibitors, it was a chance to see one of the world's greatest collections of famous, historic racecars. If you're any type of automotive enthusiast at all, the Petersen Museum will really get your pulse rate up. I had time to see only about a quarter of the exhibits, but what I saw was mighty impressive—everything from classic street rods from Ed "Big Daddy" Roth to Mickey Thompson's Challenger 1 land-speed-record car. And it isn't all vintage tin; there's something for every type of car nut.

Tim Considine and the Mini Cooper Connection

Along with the many R/C participants at the race were some genuine celebrities. Former child television actor Tim Considine, whom you may have seen on the Mickey Mouse Club's "Adventures of Spin and Marty" (he's Spin), came with his son Chris in his super-clean Austin Mini Cooper. You can guess what kind of R/C car Tim was racing that



day—a Tamiya M-chassis Mini Cooper, of course, painted to match his full-size ride. Tim was, in fact, the person who got Dan Moynihan involved with the Petersen Museum in the first place, and

that led to this event more than a year later. Tim is also a well-respected automotive journalist who writes for *European Car* magazine and several other publications.

What is the Petersen Museum?

The Petersen Automotive Museum in West Los Angeles, CA, has one of the largest and most varied car collections in the United States—everything from early 1900s "horseless carriages" to futuristic "concept" vehicles. Its four floors contain many "theme galleries" that regularly display between 150 and 200 cars. When we visited, the museum featured exhibitions of world land-speed-record-attempt cars, such as Craig Breedlove's 600mph Spirit of America, Mickey Thompson's four-engine Challenger 1 and Kenny Bernstein's Budweiser King—the first dragster to pass the 300mph mark in the quartermile. Next to them was a collection of historic Indianapolis roadsters from the 1940s, '50s and '60s that were all built locally (within 12 miles of the museum). Another gallery displayed Harley-Davidson motorcycles—more than two dozen—from vintage to late models to wild customs.

The museum, which opened in June 1994, is the dream of automotive publishing magnate Robert Petersen. It's obvious that as the museum's major benefactor, he spared no expense. This is not a typical car museum—a bunch of roped-off old cars on a linoleum floor with fluorescent lights overhead; it's a first-class operation like a fine art gallery. Elaborate displays evoke the eras in which the cars were made, so you get a little history lesson. But to me, the show's real stars were the famous, colorful racecars that I had read about while growing up. Many looked as if they had been pulled right off the track and driven onto the museum floor—road rash, burned exhaust pipes and all. What a tremendous wealth of ideas for an R/C concourse enthusiast!

If you're ever in Los Angeles with an afternoon to spare, check out the Petersen Automotive Museum on Wilshire Blvd. It's open Tuesday through Saturday from 10 to 6; call (213) 930-CARS. It's a must for hardcore car aficionados!



Three of the full-size racecars on display outside the museum: Tim Considine's Mini Cooper, an SCCA racing Corvette and the Audi Quattro rally car. This was just a taste of what was inside the museum.

HOBBY SHACK/RACE CONNECTION EXHIBITION RACE

The racing was also pretty impressive, as more than 170 entrants battled it out. It was a genuine parking-lot race, but what a parking lot it was! Not only was there room for a full-size R/C track (laid out with Dan's new high-visibility green extruded track barriers), but there was also plenty of shaded area under the fourth parking level to pit and for "Manufacturer's Row." Hobby Shack's Race Connection Series has attracted a

other car on the track. This caused some two-wheel "bicycling" in the corners, but the driver navigated the course pretty well, crushing only a few hapless competitors in the process, much to the spectators' delight.

AND THE WINNERS ARE...

• **M-chassis.** In the M-chassis competition, a guy who went by the name "Bozo" took the A-Main with 15 laps in 4:05.25

Matuo's 14, 4:10.37 led the Rookie A, followed by Conrad Curtis and Chris Jensen. Veteran Chris Chan took the close F1 Stock event with 15 laps in 4:00.84, with Mark Emerald, Ryan Stockwell, Robert Harvey, Freddy Sullivan and Jose Sida all clicking off 15 laps, too, and all within 13 seconds of one another at the finish. Bill Martinez bested Tamiya's David Jun and "Andy" in the F1 Expert A-Main. I think that's Andy Jacobsen of Andy's* bodies!

The beauty of this event was that it introduced the full-size car enthusiasts who frequent the museum to the attraction of R/C cars, and the result was a match made in heaven.

pretty fair number of competitors lately, and the unprecedented flood of entries at this event required more than 20 qualifying heats.

The competitors were of all types and skill levels—everything from the latest sedans from Kyosho*, HPI*, Tamiya* and Yokomo* to the gearbox and novice classes, where it's run-whatcha-brung. In fact, one of the more entertaining heats featured a full-tube-frame 4WD Clodbuster, whose center of gravity was at least 8 inches higher than that of any

over *Car Action* contributing author Aaron Biner and third-place finisher Nally Goenner. In the M-chassis Rookie Main, Ray Paley's 12-lap, 4:00.90 finish was good for a win over Buckaroo Banzai, Ferdinand Estiva, Tim Considine (who has a real Mini Cooper!) and Christopher Rebeck. The little M-chassis cars are a real treat to watch—surprisingly fast and very nimble, especially on a tight course.

• **F1 cars.** These were well-represented by Rookie, Stock and Expert A-Mains. Ryogo

• **Pan chassis.** The traditional pan-chassis cars did battle in the Direct Drive Stock and Expert A-Mains. Gary Lundy (16, 4:00.28) won the Stock A over Miguel Romero and Nick Bobich, who both were on a close, 16-lap pace. Direct Drive Expert went to Mike Wright with a rippin' 17-lap, 4:06.66, squeaking out a win over Doug Williams' 17 in 4:07.86 and Mike Lee (Melissa Lee's crew chief) at 17, 4:11.76.

• **Gearbox.** In Gearbox Rookie A, John Trujillo (13, 4:09.67), edged out Frederick Estiva, Kevin Hudis and Rory Nicholson, who all turned in 13-lap performances. The Gearbox Pro-Stock battle went to that Bozo guy again, over



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Raymon Ortiz, David Mars, Robert Bonar, Eric Yee and Melissa Lee, whose car DNS'd on her.

• **Touring cars.** These were by far the most popular classes, with Tamiya Sedans and the Belt-Drive Sedans running in two different categories.

The A-Main Tamiya Sedan winner was David Jun, who ran away from the rest of the field by being the sole car in his race to click off 17 laps in 4:10.12. Bob Sager and Roy Alaan both turned in 16-lap runs in 4:03.20 and 4:15.04, respectively.

The Belt Drive Stock A-Main victor was Bill Martinez (17, 4:07.02), with the next four finishers—Dion Paoner, Mr. Brad, James Johnson and Miguel Romero—turning in 16 laps.

The Sedan/Touring Expert contest saw the fastest times of the day, with Brandon McNally's superb 17-lap, 4:02.28 topping the field. Aaron Biner was close behind at 17, 4:07.67, and Bob Sager was third with another 17-lap performance in 4:13.80. These guys were flying, and Brandon's new Yokomo was the class of the field!

ONE GIANT STEP FOR R/C

Hobby Shack's event was an outstanding

... most people's exposure to the sport is primarily through kids doin' doughnuts in the neighborhood cul-de-sac... But when the museum-goers came out and saw the "R/C-a-palooza" in the back lot, the most often heard comments were along the lines of, "Wow! I didn't know these things were so fast! Where can I buy one?"

introduction to the world of R/C racing. We R/C enthusiasts sometimes forget that most people's exposure to the sport is primarily through kids doin' doughnuts in the neighborhood cul-de-sac with a chirpy little live-axle car that may or may not be attached to the controller with a wire. But when the museum-goers came out and saw the "R/C-a-palooza" in the back lot, the most often heard comments

were along the lines of, "Wow! I didn't know these things were so fast! Where can I buy one?" Or (no joke), "Can I buy your car?"

The beauty of this event was that it introduced the full-size car enthusiasts who frequent the museum to the attraction of R/C cars, and the result was a match made in heaven. I've often said that you could walk out into the middle of an open field with your R/C car, and within 10 minutes, you'd attract a small crowd of people wanting a turn at the controller. This continuing fascination bodes well for the future of our hobby, especially when it's promoted via outreach events such as this one. You've got to give credit to Dan Moynihan for, once again, having the savvy to bring together the right elements to project R/C racing into the general public's consciousness. Someday, I expect to see R/C racing on TV, like maybe ESPN, backed by some billion-dollar corporation or soft-drink company.

And I just bet there will be some bearded guy in a banana suit behind it all.

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Steet Spec News

The Trinity/Tekin Street Spec series is history, and two new winners emerged from the ranks. Bill Marshall (top right on right) took the coveted Spec title after a season-long battle with Tom Owens (top right, middle). Third place went to Jeff McMullen (top right on left). In the Invitational class, Dave Carpenter (left) came on strong mid-season to become the overall winner with a total of 515 points. Phil Marabella took second and Brian Burkhart finished third.



GET IN ON THE ACTION

Here are some of the '96 Street Spec race dates.
Come by and check it out!

NATIONAL SERIES

9/21-22 Leisure Hours Hobbies, Joliet, IL (815) 439-1777
10/12-13 Trains and Lanes, Easton, PA (610) 253-8850
11/9-10 R/C Sports, Vacaville, CA (707) 446-5555

SUMMER SERIES

8/11 On-Trax Speedway, Browns Mills, NJ (609) 735-0422
9/7 Ray's American Hobbies, Freehold, NJ (908) 446-373
9/29 Marshall Hill Top Hobbies, (717) 729-7458

call now!

Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

Bolink Legend Series
(404) 963-0252

Tamiya R/C Championship Series
(800) TAMIYA-A

Kyosho R/C Sport Racing
(800) 682-8948 ext. 085F

Hobby Shack Parking Lot
(714) 964-8846

Hobby Town USA Parking Lot
(402) 434-5050

Trinity's Street Spec Series
(908) 862-1705

A Day at Daytona

The Florida State Electric R/C Racing Series Organization took its traveling parking lot racing show to the "world's center" of racing—Daytona International Speedway. The "Speedway Spectacular" was hosted by the Daytona Electric Auto Racers club, and the members did a great job keeping the event running smoothly. Thousands of spectators attending the speedway for a custom car show (over 2,000 cars and hundreds of vendors) had the opportunity to see several classes of R/C racing, including Sports/GTP, GT F1, Legends and Superspeedway cars competing on oval layouts. The awesome track, designed by Troy Schafer, Dick Schafer and Ed Schafer, could be transformed from roadcourse to Legends to a 375-foot flat oval in about 10 minutes. According to Rick Jordan of Bolink R/C Cars Inc., "It was a great two days of racing for the 175 entrants. The Florida State Series folks [it's now in its 16th year] did a really good job of showing off R/C racing excitement. Plans are being made for a repeat performance of this spectacular event next year."



1/12 STOCK

1. Jason Ruona
2. Mike Mellin
3. Sean Cooper

1/10 STOCK

1. Mike Spehn
2. Sean Cooper
3. Nick Tomlinson

1/10 MODIFIED

1. Paul Wynn
2. Jason Ruona
3. Dave Vera

NASTRUCK

1. Jim Mervolion
2. Bob Hall
3. Mike Bean

F1 OPEN

1. Joe Conte
2. Barry Shapiro
3. Juan Sat



PHOTOGRAPH BY MICKEY MERRETT AND DON BOE

TCS Strikes AGAIN

Here are the results from two of the latest races in the Tamiya Championship Series. Race 25 was hosted by Sheldon's Hobbies in San Jose, CA, and Race 26 was held at Action Hobbies in Tulsa, OK.

RACE #25

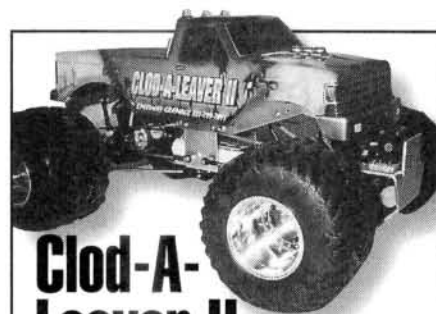
F1		4WD SEDAN	
1. Mark Rebeck	TQMark Rebeck	1. Mike Allen	TQMike Allen
2. Tom Aakre	BEST OF SHOWDoug King	2. Bob Sager	BEST OF SHOWDave Warren
3. Jim Aguirre		3. Randy Sturgeon	
FWD SEDAN		MINI	
1. Mark Rebeck	TQMark Rebeck	1. Mark Rebeck	TQMark Rebeck
2. Mike Stone	BEST OF SHOWJohn Hardmann	2. Chris Rogers	BEST OF SHOWChris Rogers
3. Justin Morgan		3. David Munar	TOP ROOKIEAlex Stankovic, Jr.

RACE #26

Right: the winners proudly display their winning cars. Below: the entrants crowd onto the track.



F1		4X4 TRUCK	
1. Jason Davis	TQJason Davis	1. Mike Wood	TQMike Wood
2. Brent Sherl	BEST OF SHOWRichard Hertado	2. Ryan Krause	BEST OF SHOWMarvin Blake
3. Russell Johnson	TOP ROOKIEChris Andrews	3. Walter Bell	
FWD SEDAN		GTP & GTO	
1. Randy Cook	TQScott Ernst	1. Jason Davis	TQJason Davis
2. Scott Ernst	BEST OF SHOWBob Enochs	2. Mark Henderson	BEST OF SHOWSteve Smith
3. Bobby Arns	TOP ROOKIEAaron Hand	3. Steve Smith	
4WD SEDAN		M-CHASSIS	
1. Randy Cook	TQScott Ernst	1. Kevin Camp	TQKevin Camp
2. Ray Parker	BEST OF SHOWScott Ernst	2. Eric Ross	BEST OF SHOWEric Ross
3. Kevin Camp		3. Steve Smith	



Clod-A-Leaver II Wins 1995 NR/CTPA World Championship

Joe Kirkwood won the 1995 World's driving a Clod-A-Leaver II-equipped Clod Buster. Other special parts used included a Tekin 420-62 speed control, PTI batteries, Trinity Kinwald motors and Thorp ball diffs.

The same chassis/suspension/steering kit is available to you and gives much better handling, much better steering, superb high-speed stability and tremendous durability for high-speed racing or just having a great time.

The kit fits both Clod Buster and Bullhead vehicles. Included in the kit are the light-weight chassis, battery tray, receiver and speed-control tray, long-wheelbase stainless ladder bars, heavy-duty 6-32 ball ends, axle-mounted steering-servo bracket/brush guard assembly, stainless-steel tie rods, full cantilever shock-mounting system and front and rear sway bars. All of these things are standard equipment on every Clod-A-Leaver II (note: cantilever shock-mounting and sway bars have been standard on Clod-A-Leavers since they became available in 1992). If you don't have a Clod Buster and would like to build one up from parts, you will need the following: the Clod-A-Leaver II Kit, two complete Clod Buster axle/gearbox assemblies, shocks, motors, all electronics, body, body mounts, wheels and tires. These parts are all available new from Bennett Equipment, or we also have a good selection of used parts at a 30 to 50% savings. We also have available rolling chassis or complete vehicles with the Clod-A-Leaver II Kit installed. We also have in stock motors, custom wheels and most other special parts for Clods as well as the stock Tamiya parts. The suggested 2-wheel-steering version of the Clod-A-Leaver II is \$225 and the 4-wheel-steering version is \$250 (both are 4-wheel drive).

The Clod-A-Leaver Jr. is a new chassis kit available for those on a budget or as an entry-level vehicle. This kit can be upgraded at any time to the full Clod-A-Leaver II specifications. The kit features the same light-weight (8 1/4 oz.) chassis, the same long wheelbase, stainless-steel ladder bars and the same heavy-duty 6-32 ball ends. The kit also includes extended steering rods and a relocated steering-servo mount. This kit will greatly improve handling and durability of the stock Clod Buster or Bullhead. The Clod-A-Leaver Jr. sells for \$129. The upgrades to bring it up to Clod-A-Leaver II specifications are: the steering kit with brush guard for \$32 (two required for 4-wheel steering), the sway-bar kit for \$40 and the full cantilever shock-mounting brackets for \$50.

Bennett Equipment

900 East 1300 South, Romney, IN 47981
(317) 538-2725 (eve.)

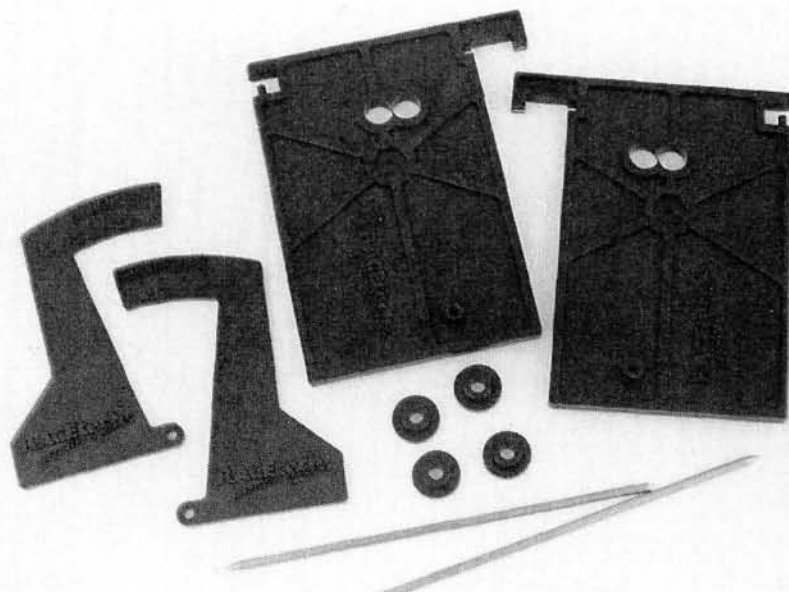
SEND \$2.00 FOR BROCHURE



RACEtech

Camber/ Toe-In Gauge

Go straight and
turn better with
help from one
easy tool



That's all, folks! Racetech's camber/toe-in gauge has few parts but plenty of features.

by Peter Viera

BUILDING a new car, eh? You've taken your time, read every instruction, followed every step, heeded all the cautions and applied all the "racer's tips." Now it's time to twist those turn-buckles. Let's see, the book says 2 degrees of negative camber on the front wheels and zero toe-in. So what do you do, racer boy? You squint, and you wing it! Two degrees of camber? That translates into "I'll just make the tires lean in a teensy bit." Zero degree toe-in? You hope so, but that's no way to accurately tune a racecar.

WHAT TO DO?

Racetech* knows just how you (and I) feel, and they have developed a nifty camber/toe-in gauge to get and keep off-road cars and trucks properly dialed in. With the Race-tech unit, you can precisely measure your vehicle's camber from +10 to -10 degrees. The gauge does not affect suspension action, so the

effect of suspension travel on camber (known as camber gain) and bump steer can easily be observed. The gauge works with any Losi* or Associated* car or truck. It's simple to use and doesn't cost a ton. Sounds like just the ticket for setting up my new RC10B2 buggy.

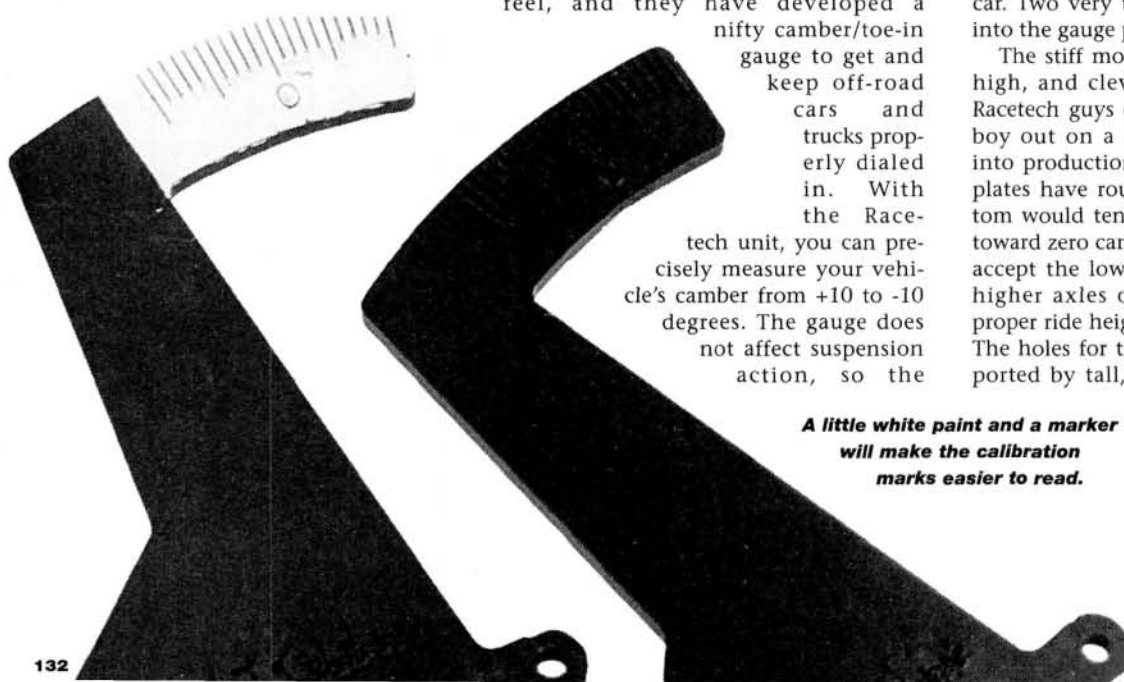
The simple gauge requires no tools to assemble. A flat gauge plate is attached to each front axle in place of the wheels and is in turn connected to a calibrated degree plate that measures camber. Bushings are fitted into the gauge plates to prevent the axles from binding; binding can throw off the measurements. A hex-shaped recess accepts the front hub of Losi's Double-X car. Two very true steel pointers pressed into the gauge plates indicate toe-in.

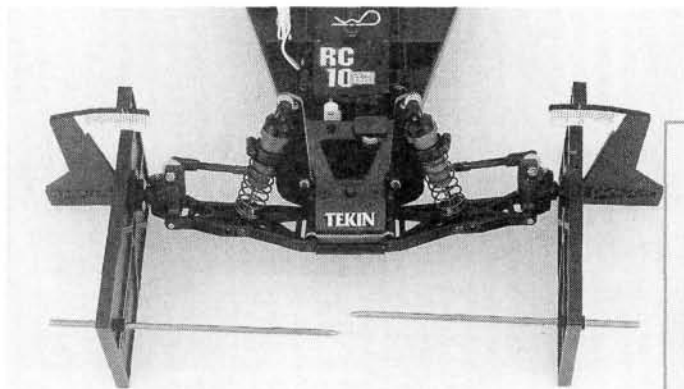
The stiff molded plates' quality is very high, and clever details show that the Racetech guys didn't just sketch this bad boy out on a napkin before they went into production. For instance, the gauge plates have rounded bottoms; a flat bottom would tend to pull the gauge plates toward zero camber. Two sets of axle holes accept the lower axles of buggies or the higher axles of trucks; this maintains proper ride height for accurate measuring. The holes for the toe-in pointers are supported by tall, molded shoulders. They

prevent the pointers from being installed at an angle and are drilled through to allow the pointers to be set wide for trucks or narrow for buggies.

A few words of cau-

A little white paint and a marker will make the calibration marks easier to read.





I thought my front end was set properly. The gauge doesn't lie; I was waaay off.

tion about these pointers: they're pretty ding-dang pointy. To avoid shish-kebabing yourself, press them, point in first, through the back of the gauge plates. When the pointers are not in use, store them in the clear plastic tube they come in. If you don't, you'll be adding "sutures" to your list of vocabulary words.

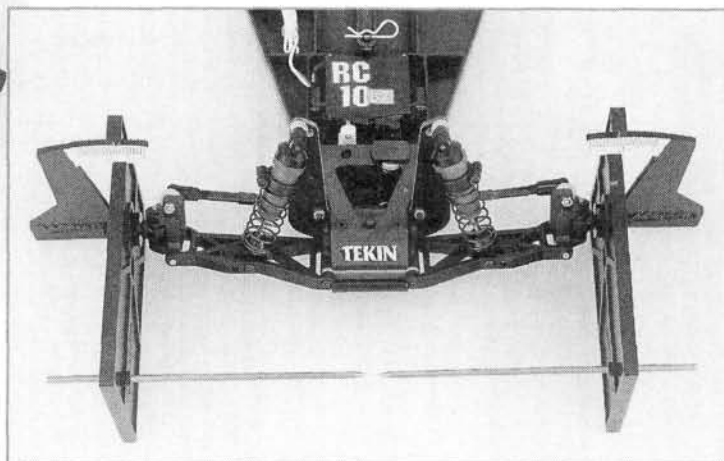
HOW WELL DOES IT WORK?

To test the gauge, I set up my B2 with what looked like factory specs (2 degrees negative camber, zero toe-in), as measured by the Steve Austin bionic-eyeball squint test. Then I bolted up the Racetech camber/toe-in gauge. As you can see in the picture, my setup was way off the mark. One side of the car actually had 1 degree of positive camber, while the other side had 6 degrees of negative camber—not good. In the view from above, you can see that my toe-in was off as well.

Tuning the car while it was bolted into the Racetech gauge showed how dramatically one turn of a turnbuckle can affect adjustment. In the case of the B2, one turn pulls the wheel in a full degree. Even an

eighth of a turn will move the Racetech's camber indicators; it's that precise.

After adjusting the camber, I went after the toe-in adjustment. To achieve zero toe-in, I adjusted the turnbuckles until the pointers met point-to-point, forming a straight line. The pointers turn inward



Much better. Two degrees negative camber, zero toe—right on the money.

had just made. Without the Racetech gauge, I probably wouldn't have known that I needed to readjust the camber. Now I can put my car on the track with complete confidence in the front end settings.

The simple gauge requires no tools to assemble. A flat gauge plate is attached to each front axle in place of the wheels and is in turn connected to a calibrated degree plate that measures camber.

or outward to indicate relative toe-in or toe-out, but they do not indicate an actual degree measurement. You can use a protractor to determine this.

I discovered that adjusting the toe-in significantly altered the camber settings I

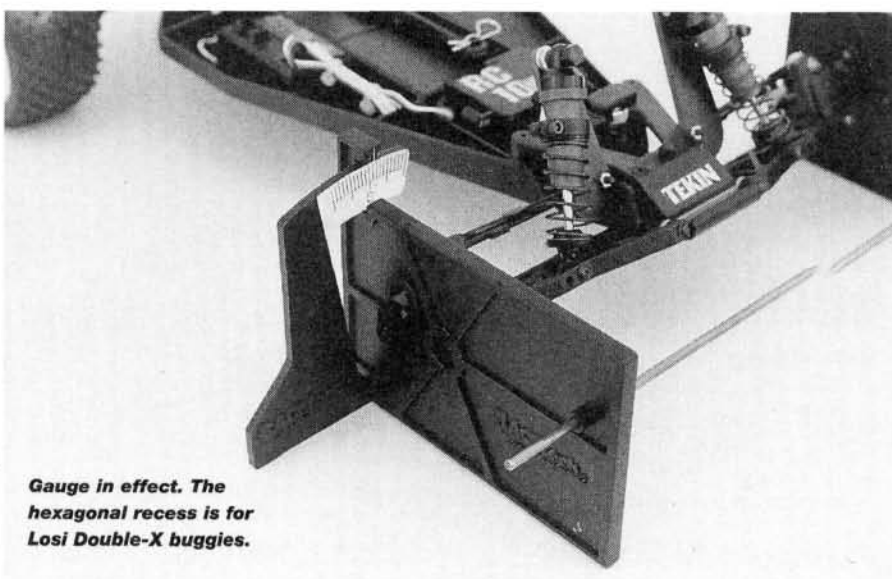
BUT WAIT, THERE'S MORE...

As useful as the Racetech gauge is when initially setting up a racecar, its real value is its ability to provide repeatable, accurate measurements. You can try a new setting without the fear that you'll never "get back" your old setup if your new adjustments don't help the car. Likewise, if you discover a setup that works, you can bolt on the gauge, note the settings and keep them on record for your next race at that track.

Overall, this is a terrific product and a worthy addition to the pit box of anyone who runs Associated or Losi off-road gear. If I must gripe, I'll say that the molded-in calibration marks should be colored for better visibility. However, they aren't what I would call hard to read; a little white paint helps, but it's not a must.

Racetech's camber/toe-in gauge is a winner. It's accurate, easy to use and portable. Get one, and you'll be measuring your success...by degrees.

**Addresses are listed alphabetically in the Index of Manufacturers on page 176.*



Gauge in effect. The hexagonal recess is for Losi Double-X buggies.

INDEX OF MANUFACTURERS

Airtronics, 15311 Barranca Pky., Irvine, CA 92718; (714) 727-1474; fax (714) 727-1962.

Andy's Hobbies, 12546 N. Kendal Dr., Miami, FL 33186.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.

AstroFlight Inc., 13311 Beach Ave., Marina Del Rey, CA 90292; (310) 821-6242.

Aveox, P.O. Box 1287, Agoura Hills, CA 91376; (818) 597-8915; fax (818) 597-0617.

Barracuda Racing, distributed by Stormer Hobbies, 23 High Speed Rd., P.O. Box 126, Glasgow, MT 59230-0126; to order (800) 255-7223; (406) 228-4569; fax (406) 228-8152.

BBR, 156 Azalia Dr., E. Palo Alto, CA 94303; (415) 327-8283.

Bich'n Bodies, 4903 Cloverfield Rd., Pearland, TX 77584; (713) 485-0413.

Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245; (770) 963-0252; fax (770) 963-7334.

Bondhus, Wiha Corp., 1400 E. Broadway, Monticello, MN 55362; (612) 295-6591; fax (612) 295-6598.

BRP Inc., 1575 Lowell St., Elyria, OH 44035; (216) 284-0270.

Cobra Int'l., 2415 Lafayette Blvd., Norfolk, VA 23509; (804) 855-0202.

Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 94931-0360; (707) 792-1316; fax (707) 792-0137.

Dan's RC Stuff, 9525-C Cozycroft Ave., Chatsworth, CA 91311.

Deans Connectors, 7628 Jackson St., Paramount, CA 90723; (310) 634-9401.

Dremel Tools, P.O. Box 1468, Racine, WI 53406-1468; (414) 554-1390; fax (414) 554-7654.

DuraTrax, distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.

East Coast Motors, 4115-D Rose Lake Dr., Charlotte, NC 28217; (704) 588-9899.

Edge Products, 412 E. Warren Ave., Bakersfield, CA 93308-4428.

Extreme Motorsports, Box 776061, 1401 Lincoln St., Steamboat Springs, CO 80477; (303) 879-5102; fax (303) 879-5108.

Extreme R/C, see World Class (address below).

Elite Speed Products, 3923 E. Mound St., Columbus, OH 43227; (614) 231-4170; fax (614) 237-4126.

Extreme Motorsports, Box 776061, 1401 Lincoln St., Steamboat Springs, CO 80477; (303) 879-5102; fax (303) 879-5108.

Fantom Racing, 50201 Silver St., Vicksburg, MI 49097; (616) 649-9583; fax (616) 649-9584.

Fine Design and Mfg., 2 North St., Middletown, NY 10940.

Full Speed Racing (FSR), 3941 Legacy Dr., Ste. 204, Plano, TX 75023; (214) 618-7038; fax (214) 618-7637.

Futaba Corp. of America, P.O. Box 19767, Irvine, CA 92713-9767; (714) 455-9888.

GPM, distributed by Hobby Etc. Inc., 650 Amherst St., Greystone Plaza, Nashua, NH 03063.

Green Machine, distributed by Trinity, 1901 E. Linden Ave., #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

Hitec/RCD Inc., 10729 Wheatlands Ave., Ste. C, Santee, CA 92071-2854; (619) 258-4940; fax (619) 449-1002.

Hobby Shack, 18480 Bandelier Circle, Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452.

HPI, 22600-C Lambert, Ste. 904, El Toro, CA 92630; (714) 837-3250; fax (714) 837-3251.

Integy/Matrix Technology, 7710 Melrose Ave., Los Angeles, CA 90046; (213) 655-3968/1860; fax (909) 627-4132.

Irrgang Racing Service, Cannon Range Rd., Rd. 4, Box 411, Milnray, NJ 08340.

Jaco/Pro-Line, see Pro-Line.

Japan R/C Imports, P.O. Box 7009-152, Lafayette, CA 94549; phone and fax (510) 284-5778.

JR, distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

K&S Engineering, 6917 W. 59th St., Chicago, IL 60638; (312) 586-8503.

Kimbrough Products, 1322 Bell Ave., Unit 1-C, Tustin, CA 92680; (714) 258-7426.

Kose, distributed by Japan R/C, P.O. Box 7009-152, Lafayette, CA 94549; (510) 284-5778; (510) 284-5778.

Kyosho/Great Planes Model Distributors, 2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

LAVco, 2646 Dupont Dr., Ste. #20-491, Irvine, CA 92715; (714) 261-6877; fax (714) 261-6878.

Lightz Products, P.O. Box 24910, Tempe, AZ 85282; (602) 894-6908; fax (602) 968-5058.

Litespeed, P.O. Box 4765, Spokane, WA 99202; (509) 535-2717.

Lockmann Precision, 17344 Eucalyptus, Unit 1-B, Hesperia, CA 92345; (619) 947-3684; fax (619) 947-3689.

Locite, 18731 Cranwood Ct., Cleveland, OH 44128.

Losi, see Team Losi

Lunsford Racing, 2500 Three Lakes Rd., Ste. A, Albany, OR 97321; (503) 928-0587; fax (503) 967-5917.

Maxtec Development, 3740 Overland Ave., Ste. B, Los Angeles, CA 90034; (310) 815-0251; fax (310) 815-0253.

MIP, 746 E. Edna Place, Covina, CA 91723; (818) 339-9008; fax (818) 966-2901.

Motion Graphics, 2645 Robert Arthur Rd., Westminster, MD 21158; (410) 848-0008.

Motor Man, distributed by Hobby Warehouse of Sacramento, 8950 Osage Ave., Sacramento, CA 95828; to order (800) 333-3640; (916) 381-7588; fax (916) 381-7589.

Novak Electronics Inc., 18910 Teller Ave., Irvine, CA 92715; (714) 833-8873; (714) 833-1631.

Paragon Racing Products, 340 Industrial Blvd., Waconia, MN 55387-1738; (612) 442-6364; fax (612) 442-6368.

Parma Int'l., 13927 Progress Pky., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.

Peak Performance, 23352-J Madero Rd., Mission Viejo, CA 92691; (714) 707-4683; fax (714) 707-4684.

Point Blank, distributed by Trinity Products (see address below).

Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

Protoform Inc., P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

Race Prep, 852 S. Hwy. 89, Chino Valley, AZ 86323; (602) 636-1955; fax (602) 636-1956.

Racer's Choice, P.O. Box 405, Medinah, IL 60157; (708) 980-4863.

Race Prep Racing Motors, P.O. Box 494, Paulden, AZ 86334; (818) 709-6880; fax (818) 709-0520.

Racetech, 4406 14th Ave., Parkersburg, WV 26101; (314) 531-3003; fax (314) 531-5678.

Racer's Edge, 412 E. Warren Ave., Bakersfield, CA 93301; (805) 393-1040.

RCPS, 18312 Gifford St., Fountain Valley, CA 92708; (714) 962-6928.

Reedy, distributed by Associated Electrics (see above).

Robinson Racing Products, 4968 Meadow View Dr., Mariposa, CA 95338; (209) 966-2465; fax (209) 966-5937.

R/S Hobbies, 1205 N.E. Belleaire, Andrews, TX 79714; (915) 523-6798.

RPM Inc., 14978 Sierra Bonita Ln., Chino, CA 91710; (909) 393-0366; fax (909) 393-0465.

Schumacher USA, 6302 Benjamin Rd., Ste. 404, Tampa, FL 33634; (813) 889-9691; (813) 889-9593.

Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A; (714) 362-2250.

TD Enterprises, P.O. Box 3301, Lexington, OH 44904; (414) 884-2004.

Team Associated, see Associated Electrics.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9400; fax (909) 590-1496.

Tech Racing, distributed by GHI/Ultimate Hobbies, P.O. Box 5872, Orange, CA 92613; (714) 921-0322.

Tekin Electronics, 940 Calle Negocio, San Clemente, CA 92673; (714) 498-9518; fax (714) 498-6339.

Tenth Technology, Shornebury Pear Tree Lane, Shorne, Kent, England, U.K., DA123JX; (047) 482-4444.

TM Racing, 49679 Leona Dr., Chesterfield, MI 48051; (810) 949-3506; fax (810) 949-3506.

Tower Hobbies, P.O. Box 9078, Champaign, IL 61826-9078; (800) 637-4989; fax (800) 637-7303.

Tozai, distributed by Japan R/C Imports, P.O. Box 7009-152, Lafayette, CA 94549; (510) 284-5778 phone and fax.

Traxxas Corp., 12150 Shiloh Rd., #120, Dallas, TX 75228; (214) 613-3300; fax (214) 613-3599.

TRC, P.O. Box 1058, 210 Charter St., Albemarle, NC 28002; (704) 982-0507; fax (704) 982-0672.

Trinity Products, 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

Twister Motors, 657 E. Arrow Hwy., Ste. H, Glendora, CA 91740.

Weedezine (formerly Weed Designs): Mike Weed, c/o So Cal R/C Raceway, 11930 Valley View St., Garden Grove, CA 92645.

Yokomo Ltd., P.O. Box 5872, Orange, CA 92613; (714) 921-0380.

World Class, 1430 Florida Ave., Ste. 217, Longmont, CO 80501; (303) 684-9450; fax (303) 684-9613.

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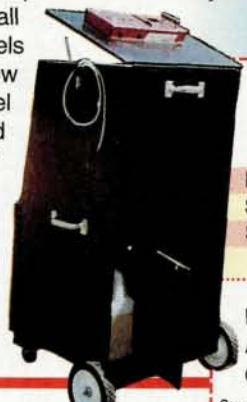
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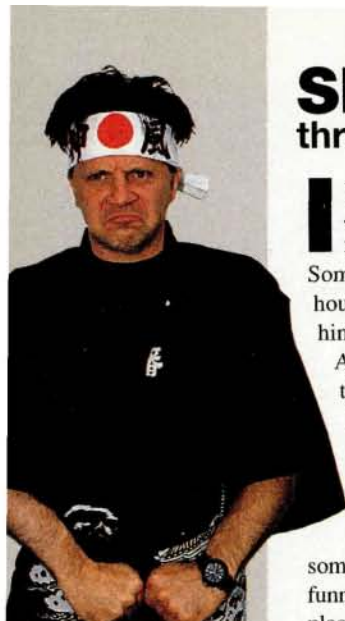
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Chris's



This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire Car Action staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897. My internet address is: chrisc@airage.com

Shizuoka— through the eyes of Chris

I was so excited and jealous about Frank's trip to Japan that I did everything I could to make myself feel that I really *did* go along for the ride. Sometimes, when I wake up in the cold pre-dawn hours, I'm not sure whether I actually went with him or not!

As you can see from some of the photos, I was there in spirit. This much is certain: I love Japan; I love the Far East—a cool, mightily intriguing part of the world.

I've been to the Shizuoka show, and when perusing Masi-san's photos, I came to the inescapable conclusion that he had missed some very important highlights. You know, it's a funny thing, but two people can go to the same place, and it's as if they started on the same path but ended in parallel universes. Why is that? Is it because we all see what we want to see? Is it because one of them has a totally twisted mind? (I'm thinking too much again—ouch!) I guess it's best to say that we all see things in our own way and just leave it at that. It's certainly best not to go into my head without adult supervision.

Naturally, I took what, in my highly esteemed opinion, are these shots of crucial concerns that Frank missed. I placed them here, on MY PAGE!—MINE!...Gee, I wonder why they didn't send me this year...

Godzilla, Frank! How could you leave out Godzilla? Talk about a Japanese icon. I mean, come on! (See, they should have sent me!) I close my eyes and I can hear that big fella's elephant-played-backwards voice—music to mine ears.



I wasn't the only one who yearned to go to Japan. John "Slug Boy" Howell (known to those close to him as "Sluggie") wanted to go—very badly! John had cocooned himself in Frank's luggage for a restful, and free, ride in the pupa stage—a most clever plan. Unfortunately, John's scheme went awry when he was discovered by customs agents and turned directly over to the head chef, grand master Mashu-san. The inventive culinary wizard used poor John to whip up a fresh batch of Sluggiyaki.



Associate publisher Sharon Warner's favorite superhero is obviously Solar Cat of the Critters Courageous Three featured in the July issue's "Back Lot." Personally, I'm partial to Jet Pilot Piglet.



Plastic girls on the beach! Oh, wait; you only need to go as far west as Venice Beach, CA, to see that.

Green tea ice cream. So Frank, how come you missed this one? A Japanese original. Now, I've eaten untold gallons of this wonderful stuff, but never out of a cone. Was I asleep when I was over there, or have I missed out on something new? Either way, I'm pissed.



In Japan, the car they give you to use when you're visiting is an excellent gauge of how cool they think you are. When I was there, they gave me a choice of a silver Mazda RX-7/R1 or a fire-engine-red Acura NSX. Pictured above were Frank's two choices.



From: Stuart "Cannie" Cann
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Uxbridge College, U.K.
To: chrisc@airage.com

With regard to your discussion in the April issue about whether to have 4- or 5-minute races: I think I can help resolve your argument. Here in Europe, we race 5 minutes on grass and have no trouble. This is not bad considering that grass produces more drag than the clay you race on. Because of price limits, we are not allowed to run expensive cells such as the Trinity WorldTech.

Most people run without trouble on cheap packs, and the racing is still fast and furious. Having an extra minute means slightly lower gearing, which helps keep the motors cooler—no bad thing. It also gives drivers extra time on the track, so they develop their skills faster. We used to race 4 minutes on-road, but I could only gear the car to run for 5 because it would overheat if I didn't.

I hope that the view of someone with experience of 5-minute racing will help you racers over there make your decision. Stu C

Thanks, Stuart, for your insight and opinion—both obviously the result of firsthand experience. Gearing. What a novel concept! I love the guys who say, "I'll dump in a 5-minute race." When the same people dump in a 4-minute race, I wonder whether they have the urge to say, "I dumped because I'm geared for a 3-minute race." Everyone has to gear for the same duration, batteries not withstanding; glad to see you Europeans eliminate the expensive ones. I was also pleased that you pointed out the collateral benefits: cooler running motors and how, as I put it, increased time lets driver skill shine. CC